# INTERNATIONAL PROJECTIONIST



JANUARY 1957

VOLUME 32 • NUMBER 1

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# Monthly Chat

## Thoughts about the Past Year

ANOTHER year has passed and the motion picture exhibition industry is still very much with us, alive and kicking despite predictions of doom. It might in fact be said that 1956 was a year in which the industry gained slightly in the struggle with TV and the other forces fighting for the public's entertainment dollar. There is particular cause to rejoice in the accomplishment of the drive-in section of the industry. At the height of last summer, when the drive-in season was busiest, the total movie audience in both indoor and outdoor theatres was almost equal to that of the happy, pre-TV days when exhibitors didn't have to worry about competition.

But, despite the achievement with drive-in theatres, the year 1956 was still an indecisive and unsettled one. There were, for instance, the predictions by certain highly placed circuit executives that thousands of additional indoor theatres may be forced to close within the next few years. At year's end these predictions were generally considered to be exaggerated, but in support of the pessimistic view there remains the fact that many theatres are not making money and are often kept open by real estate interests which realize that the closing of these theatres would seriously injure the commercial value of shopping districts where they are located. This is testimony to the great value of a local theatre as a community service, but it also puts such theatres in a depressing position similar to that of a poor relation dependent on reluctant kin for support.

Such theatres are typically broken-down old opera houses or surviving nickelodeons where projectionists struggle with weird projection angles and outmoded equipment while trying to obtain an acceptable wide-screen, "new-process" picture. The results just don't come off and patrons complain about poor projection, just as they complain about dirt, rowdy teen-agers and the general lack of service in theatres where a management without hope in the future devotes itself almost exclusively to uncovering new ways of scrimping and cutting manpower.

Such defeatism is no solution to present problems. Starting with the projection room, which is the very heart of any theatre, changes must be made in these houses. At least the minimum of new equipment necessary for a pleasing wide-screen picture should be purchased. In the long run it is likely to be far more costly to continue doing business at a loss than to make an investment that will result in a finer projected picture. This investment could give a new lease on life to neighborhood houses that are now slowly dying.

Although they cannot, of course, duplicate the perfect projection conditions, exhibitors and projectionists in theatres that are in trouble can take heart from the success of the newly built theatre in Syosset, Long Island, which is described elsewhere in this issue. The two circuits that cooperated in the building of this theatre spared no expense in construction or in projection and sound equipment. The investment is paying off even though other theatres are failing because this theatre provides its customers with an experience that can never be duplicated on a home TV set.


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# Transmitting Power to Arc Lamps

By ROBERT A. MITCHELL

**This practical guide to evaluating an arc-lamp power supply and maintaining it at peak efficiency examines every aspect of current transmission from the power plant to the carbon.**

THE BEST projection lamp in the world is almost useless if not properly powered. The high intensity carbon arc refuses to tolerate improper voltage characteristics or variations in the current supplied to it. In lamps not having automatic control of the crater position and feeding of the carbons, a fluctuating power supply may also seriously interfere with proper functioning of the feed mechanism.

In certain sections of the country, projection arcs in theatres unfortunately labor under the disadvantage of an unsatisfactory power supply and faulty transmission of the power from the source to the lamps. Aside from the fire hazard created by overheated cables, DC arc-circuit wiring of inadequate size, while not detrimental to arc-lamp operation when motor-generators are used, waste electrical energy and fail to deliver the maximum available current to the arcs when rectifiers supply the DC. (When generators supply the power, voltage drop in the transmission line can be compensated by reducing the amount of voltage drop in the ballast resistors. Ballast rheostats are not used with rectifiers.)

Erratic arc power due to corroded and loose contacts is not uncommon; and when a faulty connection is located inside the lamphouse, the heat of the lamp conceals the identity of the "burning" contact.

### *Uneven Current Supply*

Even perfect rectifiers cannot cope with the unfavorable characteristics of AC input current supplied by some commercial power companies. To prevent flickering of the screen illumination, only motor-generator sets should be used in localities where the AC input current fluctuates in voltage or exhibits different and varying degrees of power factor between the several phases of polyphase current.

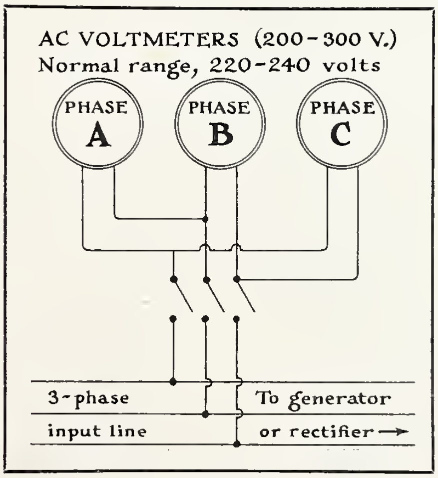


FIG. 1. How AC voltmeters are connected to a 3-phase power line.

The power factor of current from AC mains is extremely important to the users of rectifiers operated on 3-phase current. Differences in power factor will make the projected light flicker, and a low power factor will seriously reduce arc current and give a dim light on the screen. And yet the AC input ammeters and voltmeters may indicate maximum power consumption.

The power factor of alternating current is 1 only when the current (amperes) and pressure (volts) are in step with one another as the current undergoes its rapid alterations.

If the current leads or lags behind the voltage, the power factor decreases; that is, the number of watts consumed in a circuit (measured by a wattmeter) is less than the mathematical product of volts *times* amperes. This is why the terms "volt-amperes" and "kilovolt-amperes" are often used in place of "watts" and "kilowatts" in discussions of power consumption in AC circuits.

When the power factor is 0 (current and voltage 90 degreees out of phase), the current is called "wattless," and is incapable of operating electrical devices. Power factors of 0.8 to 0.9 are usual in 3-phase lines; and a power factor less than 0.7 in one or more of the three phases will occasionaly occur. The disparity usually arises through

the operation of streetlights from one phase and the operation of inductive devices, such as motors, from one of the remaining phases.

Voltage disparities in 3-phase lines are equally troublesome to the users of arc rectifiers. These may be checked by three identical AC voltmeters of suitable voltage range, each one connected across one phase (Fig. 1). An enclosed 3-pole switch should be used in lieu of a relay for turning the voltmeters on and off. *Voltages as high as 220 are extremely dangerous!*

### Voltmeters, Ammeters

More useful to the projectionist, however, are the meters in the DC arc circuit. Every arc circuit should have a DC voltmeter to indicate the output voltage at the generator or rectifier terminals, and also a DC ammeter to indicate the amount of current flowing through the arc and all other components of the circuit. It is preferable to have two ammeters, one for each lamp, although it is possible to get by with only one ammeter if the shunt be inserted into the circuit between one of the generator output terminals and the ballast resistors. See Figs. 2A and 2B. (Use of one ammeter eliminates the possibility of any differences in meter accuracy.)

An extra DC voltmeter connected across the lamphouse carbon-holder terminals, while not absolutely required, is useful for keeping the projectionist posted on the prevailing arc drop (voltage difference between the positive and negative carbons). This voltage is always less than the DC-supply output voltage when the arc is burning, and varies according to the length of the arc gap. The closer the carbons are brought together, the lower the voltage reading.

A few theatres are entirely without meters of any kind in the arc-lamp circuits. It's rather surprising that the projectionists are willing to get along without them. With no meters to keep them informed as to the output of the DC conversion apparatus and the current consumed in the lamps, they can only guess that everything is working efficiently. They often guess wrong.

*All* projection-room circuits should be adequately metered, for that matter. An AC voltmeter reading from 100 to 150 volts should be installed in every projection room to indicate the prevailing line voltage. And the absence of a generator or rectifier DC output voltmeter is unthinkable.

In many cases the original arc-lamp ammeters are never replaced when they break down. There is no good reason why an electric meter should ever break down, of course; but many are injured by excessive heat and strong magnetic fields in the lamphouse. A grossly inaccurate meter is little better than none at all.

The arc ammeters should be placed either in the control cabinet or on the projection-room wall where they can be seen by the projectionist as he adjusts the arc gap or the positioning of the carbons of each lamp. If two ammeters are used, one for each lamp, they should be conspicuously labelled "Projector 1" and "Projector 2," with corresponding numerals neatly and legibly painted on the lamphouses.

Before discussing the possible weak points in a projection-arc circuit—points represented by electrical apparatus and by wiring, switches, fuse blocks, and connections—let's remind ourselves of a simple fact of physics, namely, that all wasted electrical power is converted into heat *at the piont where it is wasted.*

An inefficient AC-to-DC converting apparatus or a loose connection offers *resistance* to the flow of current; and as long as the current flows, the resistance develops heat. The heat may do a great deal of harm by damaging costly units or by starting fires.

### Spotting Inefficiency

Because all forms of energy—light, sound, electricity, and kinetic energy—all eventually end up as heat, the quantity of energy originally present may be ascertained by measuring the amount of heat it produces. The heat produced anywhere in an arc-lamp circuit thus represents electrical energy which is totally lost so far as screen illumination is concerned.

As a matter of fact the power-transmitting efficiency of a motor-generator set or a rectifier can also be found by measuring the amount of heat produced by its operation. Accurate measurement of heat is so difficult, however, that the efficiency of electrical apparatus is usually determined by dividing the output power by the input power in watts. Nevertheless, the heat-measurement method is scientifically valid.

There is not much difference between the efficiencies of rectifiers and motor-generator sets. Stack (selenium) and tube-type rectifiers including their transformers, reactances, and other integral arc-current components have power-handling efficiencies of 70-90%, while motor-generator sets have overall

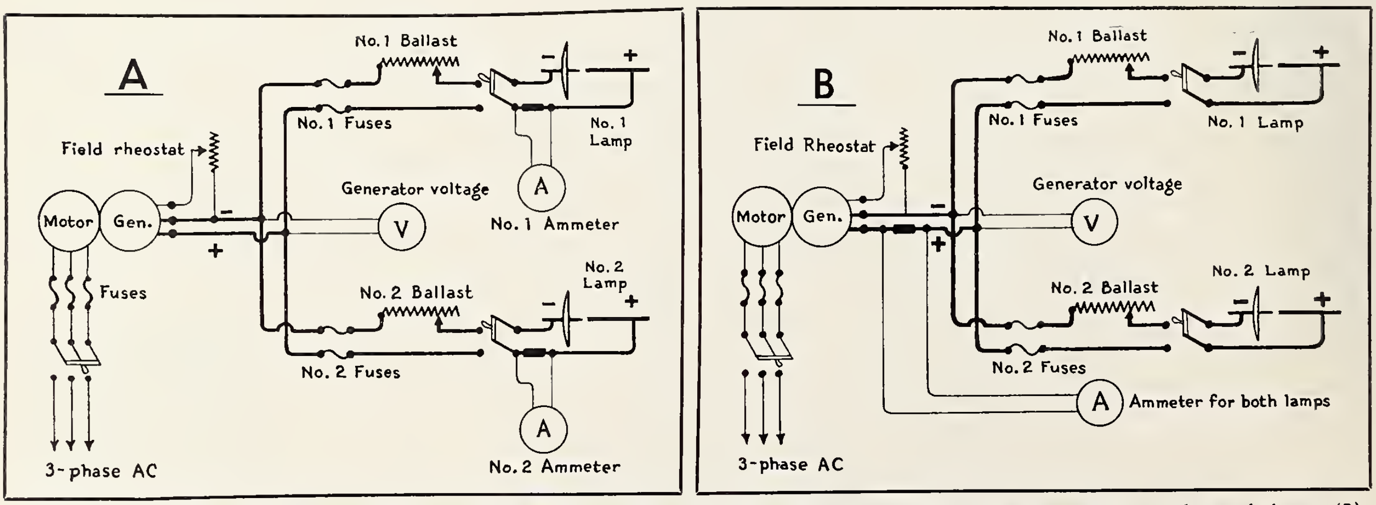


FIG. 2. Diagram showing the placement of meters in an arc-lamp circuit. (A) illustrates circuit having two ammeters, one for each lamp; (B) shows the alternative hookup employing one ammeter for both lamps.

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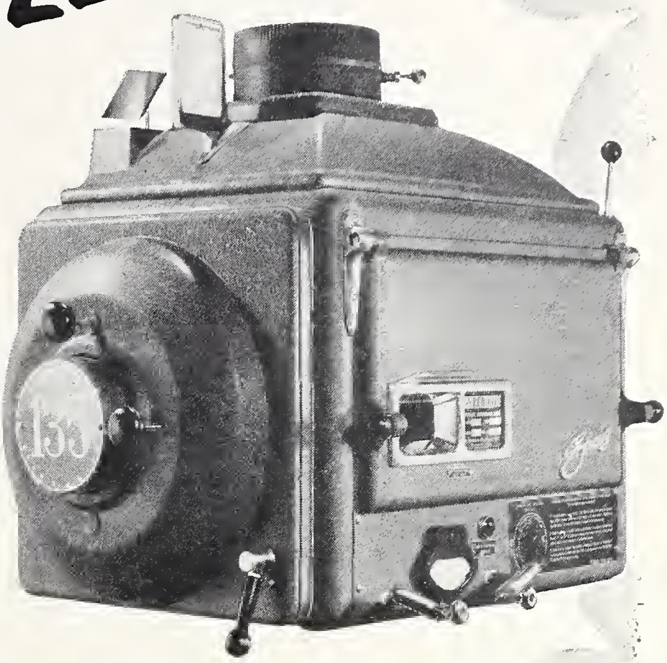

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efficiencies of 80-85%. Motor-generators, however, require the use of a ballast resistor for each arc lamp. Use of ballast rheostats cuts the efficiency of the motor-generator down to 60-70%.

### The Ballast Rheostat

An arc-lamp ballast rheostat closely resembles an ordinary electric heater. In fact, the rheostat generates heat by impeding the flow of current. The heat represents wasted power; but in this case the waste is absolutely necessary. The voltage characteristics of multiple-arc generators are such that some means of limiting the amount of current (amperes) is mandatory. The carbon arc offers less resistance to the flow of current as its temperature rises; and if there were no ballast resistance in the circuit to keep the resistance of the arc, itself, in check, more and more current would flow until the generator became virtually short-circuited. An overloaded generator demagnetizes itself and stops generating current.

Too great a ballast resistance results in an unnecessarily great waste of power. Insufficient ballast results in an erratic unstable arc and a flickering light on the screen.

Arc circuits supplied with DC by rectifiers need no ballast resistance. The inductive reactance of the AC transformer functions as a ballast which, happily, consumes no power and produces no heat. So while rectifiers and generator sets have about the same intrinsic efficiency, the use of generators requires power-wasting ballast rheostats not necessary with rectifiers.

Electrical efficiency, however, is not the only factor to be considered when choosing an AC-to-DC current-converting device for powering projection arcs. Stability and reliability are just as important. The loss of power in the ballast rheostat is smaller than the losses occurrring in those stack rectifiers which have deteriorated through age, and is admittedly a small price to pay for satisfactory performance.

### Popularity of Rectifiers

Rectifiers are popular because of their low initial cost and silent operation. Moreover, selenium rectifiers are now made with sufficient power-handling capacity to operate even the most powerful arcs. But as every projectionist learns by experience, the power requirements of high-intensity arcs are very exacting. The carbon arc is a device that tolerates no irregularities in the current supplied to it.

By rectifying the alternating current furnished by an inefficient power company a rectifier passes on to the arc the ups and downs of the supplied AC and, in the case of polyphase current, fails to compensate for phase imbalance. The rectification may be 3-phase, 6-phase, or even 12-phase, but the ripple in the DC output is nearly always a 60-cycle ripple.

A 60-cycle ripple in the current fed to the arcs interacts with the 48-cycle projector-shutter frequency to produce a 12-cycle "beat frequency" clearly visible as flicker when the ripple factor exceds 3 or 4% of the total output voltage (Fig. 3). Since the ripple originating in the rectifier itself may amount to as much as 5%, and because phase imbalance of the AC input may be as great as 10%, flicker of the projected pictures when rectifiers are used is often extremely annoying.

Tungar-tube and selenium-stack rectifiers are favored at the present time, the latter for arc currents exceeding 60 or 70 amperes. The advantage of the selenium type is its long life (estimated to be more than 50,000 hours) and consequent elimination of the need for tube replacements. Selenium rectifiers also have a lower inherent ripple factor.

Motor-generator sets, in spite of their lower power-conversion efficiency when used with the necessary ballast resistors, have a long life with little or no deterioration of output. They require only infrequent repairs (replacement or brushes, smoothing of the commutator in a lathe, etc.) and are tolerant of abuse and neglect. The initial cost of a good motor-generator set is nevertheless higher than that of a rectifier, and all except the models having sealed bearings require lubrication about once a year in the case of those having grease-lubricated ball or roller bearings, once a month if oil-lubricated sleeve bearings are used.

The outstanding advantages of motor-generator sets consist of their ruggedness and unsurpassed ability to deliver a ripple-free direct current of constant voltage at all loads. Even large mains-voltage fluctuations and phase disparities do not affect the DC output when the generator drive motor is of the 3-phase induction type. Such fluctuations, if very large, temporarily reduce the power-converting efficiency of the set (by heating the drive motor), but do not disturb the constancy of the generated DC.

### Other Links in Chain

Regardless of whether generators or rectifiers are used, there are other links in the power-transmission chain which, if weak, will adversely affect the quality of the screen illumination.

If a motor-generator set is used, the condition of the field rheostats (usually in the control cabinet) should be checked. While these rheostats and their connecting wires carry only a weak current, it should not be assumed that they are unimportant. If the generator shunt-field circuit is broken, generation of current will stop.

The conducting wires which carry the DC from the generator or rectifier output terminals to the arcs are important from the standpoint of safety as well as of electrical efficiency. If these wires (two leading to each lamp) are too small in size, they will offer sufficient resistance to the current to produce heat as well as a loss of power. The fire hazard is a very important

(*Continued on page* 26)

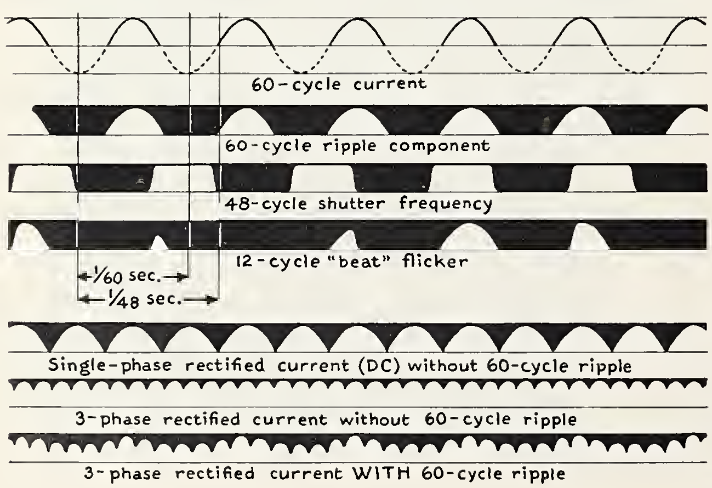



FIG. 3. The production of 12-cycle flicker by 60-cycle ripple in rectifier output current.

**An auditorium designed for the wide screen, dual-purpose Todd-AO projectors and high-quality stereosound are features of a new indoor theatre located near New York City.**

# The Syosset—A Completely Modern Indoor Theatre

**By TOM PRENDERGAST**

**Projection and Sound Engineering Depart., Skouras Theatres**

A NEW theatre built around a projection sound system that may well be the start of a new trend in motion picture equipment recently opened in Syosset, Long Island, near New York City. One of the few indoor theatres built in this area in recent years, the Syosset, which is jointly owned by the Skouras and Prudential circuits, has a great advantage over most indoor theatres in that it was specifically designed for the pleasing presentation of wide-screen pictures with stereophonic sound.

Most important of all, the Syosset, is the first theatre in the world to use both regular 35-mm film and 70-mm Todd-AO prints in the same machines with dual-purpose Todd-AO projectors. When the theatre opened last fall, the 70-mm version of Oklahoma was presented at a gala premiere. Then, for some weeks the theatre made use of three different bills all on 35-mm prints, before going into a two-week run with the 70-mm version of Oklahoma.

I think our success with dual-purpose projectors will be of interest to everyone in the motion picture industry. Here is a situation where a relatively small theatre is able to capitalize on the great projection improvement that comes from the use of wide-gauge film without the need for additional projectors to handle 35-mm prints.

### *Screen Dominates*

As mentioned earlier, the Syosset is an unusual theatre—one built for modern projection techniques. All distraction is avoided in the simple modern decorations of the auditorium and all audience attention is focused on the 60-foot screen that covers the entire front of the theatre. No proscenium

The 60-foot adjustable curved screen as seen from the projection room. Projection throw is 145 feet at an angle of 6 degrees.

arch interferes with the screen which is mounted on a special adjustable frame that allows for changes in curvature whenever desired.

The screen is the new high-gain white type manufactured by Raytone Screen Co. which is known as the Wondertone. This screen provides a considerably higher light gain than is possible with the standard white screen while at the same time remaining sufficiently diffusive for good side-seat viewing. The gain is accomplished through a metallic component added to the regular white pigments during a special compounding process.

Viewed from the center, the new Raytone screen provides a gain of 1.30 compared with 0.85 for the standard matte screen. At viewing angles of 35 to 40 degrees this screen provides a light return of about 0.85, approximately the same as standard white screens. The figures used here are determined by comparing screens to an ideal white reflective surface which is taken to equal 1.

The adjustable frame for the 60-foot screen is constructed of angled aluminum which is highly elastic. It is permanently anchored at two locations near the center of the stage. Both ends of the frame can be adjusted forward or backward for altering the screen's curvature. This frame is manufactured by the Joe Malone organization of Cheswick, Penna.

Another interesting technical feature of the Syosset is the sound reproducing system. We make use of 27 surround speakers, all of which are located in the ceiling. By mounting the speakers in this way, we insure that, no matter where a patron sits in the theatre, he will never be in such close proximity to the surround horns as to receive an undesirable directional effect. By this I mean that directional sound from behind the screen is good, but that surround sound should be diffused throughout the theatre and should not appear to come from a particular spot on a side wall.

The 27 surround horns are 12-inch Philips Norelco cone speakers containing built-in line-matching transformers designed for use in surround installations. They are positioned in the ceiling over both balcony and orchestra, and also in the ceiling under the balcony.

### *Volume Adjustment*

We compensate for the difference in volume required in the ceiling speakers compared with those mounted under the balcony, where they are in closer proximity to the audience,

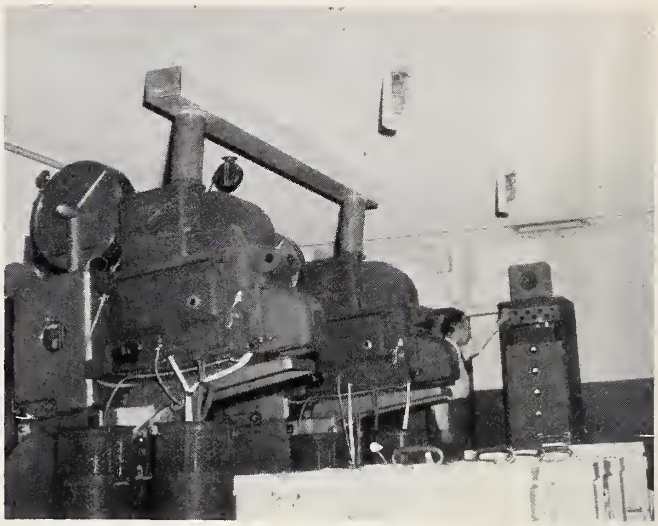

Exterior of the new theatre at Syosett, Long Island, showing the modern, functional decor.

by the use of two power amplifiers with the surround channel. One amplifier feeds the ceiling speaker while the other, differently adjusted, feeds the under-balcony speakers. That is why our sound system contains 7 amplifiers even though the complete Todd-AO sound system has only 6 sound tracks.

The ceiling location for the surround speakers was possible at the Syosset because of the modern design of the theatre and would not be feasible in many theatres of older design.

The entire sound reproduction system is the most modern possible. Any known system of motion picture sound recording can be accommodated, whether it be standard optical, 4-track CinemaScope stereosound or 6-track stereophonic sound. A simple switching device mounted on the projector head feeds the signal from either the magnetic or optical pickups to the amplifying system.

The magnetic soundhead is unusual in that it contains 10 magnetic-track pickups in a single cluster. When 70-mm film is in the projector, 6 of the pickups are registered against the striping on the Todd-AO print. The other 4 pickups register against the soundtracks when the 35-mm CinemaScope film is being run.



Interior of the spacious projection room at the Syosset Theatre where both 35- and 70-mm film is projected. The two Todd-AO projectors and Ashcraft Super Cinex lamps can be seen at the left. In the foreground are large film cases used for carrying 70-mm prints of "Oklahoma." The author adjusts the 7-channel Ampex power amplifier shown in the background. The arc lamps burn 13.6-mm carbons at about 150 amperes.

### 35- to 70-mm Conversion

Both magnetic and optical soundheads are integral with the projector head and are manufactured by Philips of Eindhoven in Holland. The amplifiers are manufactured by the Ampex Corp., Redwood City, Calif.

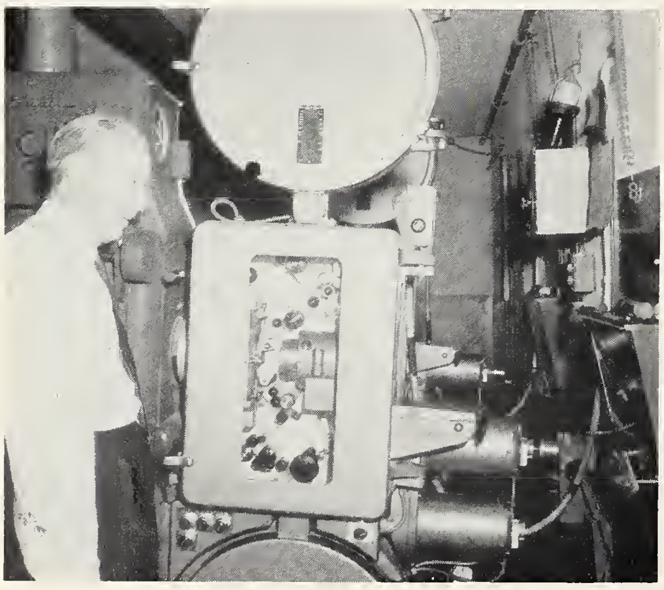
The method by which certain components on the Todd-AO projector are switched to convert from 70-mm to 35-mm projection have been described before, but since this is the first regular installation where such a procedure has been followed by the regular projection crew, I will describe our routine. It takes one of our two-man crews less than one-half hour to prepare for a switch.

The actual steps necessary in converting the projector to a different gauge film are as follows:

1) Change the top pad roller assembly.
2) Change gate assembly.
3) Change aperture plate.
4) Change lower hold-back pad roller assembly.
5) Change projector lens.
6) Change magnetic reproducer idler roller.
7) Change film tension bands.

Also, depending on the type of arc lamp used, certain lamp adjustments may be necessary to obtain a large or smaller aperture spot. With the new Ashcraft Super Cinex lamps employed at the Syosset, different mirrors are used for 35-mm and 70-mm projection.

Theatres like the Syosset may well be the answer to many questions with regard the future of the indoor theatre. Complaints about poor projection are widespread and most of these complaints can be traced to inadequate, outmoded auditoriums where first-class wide-screen projection is difficult or even impossible. Complaints of this kind need never occur about a modern auditorium such as the Syosset. In addition, we are able to obtain the quality screen image possible with 70-mm prints whenever these prints are available.



Projectionist Herb Butterworth, member of Local 640, examining dual-purpose Todd-AO projector. Magnetic and optical soundheads are integral with the projector head.

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### Electronics Boom Predicted

In ten years, electronics will be an $18,000,000,000 business, according to RCA president Frank M. Folsom. Folsom, speaking at the opening of the new $1,400,000 center of the RCA Distributing Corp. in Los Angeles, asserted that in a decade electronics will have a 60% rise over its present business level, and would be well up among the five top manufacturing industries in this country. In the last ten years RCA has tripled the size of its facilities.

### New Paromel Distributor

Theatrical Equipment Co., of Honolulu, has been appointed exclusive distributor of Paromel-DeVry sound projection equipment in the Hawaiian Islands. Theatrical Equipment Co. is headed by R. H. Jackson. The firm will carry a complete line of Paromel-DeVry equipment together with repair parts for all models of DeVry projectors.

# Faster Pulldown Geneva Movements

By JOSE M. RUIZ

**In this second installment, designer Ruiz considers three basic ways to speed up the geneva intermittent, and suggests the best solution for present problems.**

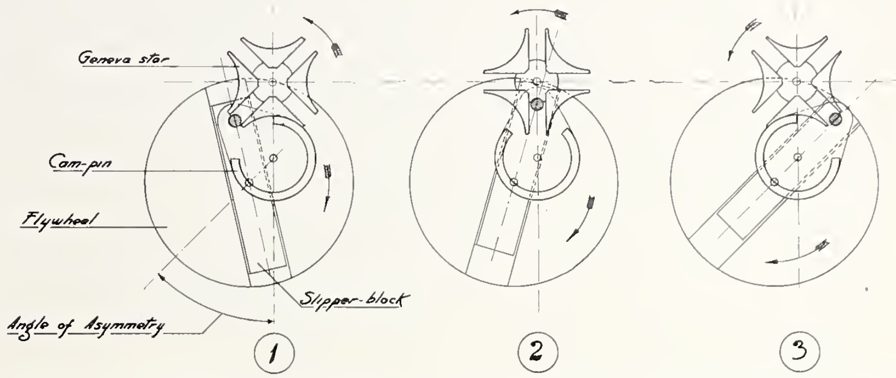


FIG. 13. Three positions in the pulldown cycle of the Radion II, a 35-mm projector manufactured in France that uses the acceleration system diagrammed in Figs. 11 and 12. The offset driving shafts and "slipper block" described in the accompanying article make it possible to accelerate the pulldown action of a standard-size geneva star wheel and cam.

BACK IN 1926, Publix Theatres in New York City tried a projection system called "Magnascope." The Magnascope was first used at the Rivoli Theatre in New York in showing certain scenes of the historical film "Old Ironsides." These scenes were magnified to almost four times the conventional aspect ratio. The Simplex projector was of special design and fitted with a fast intermittent movement of only 72-degrees cam action. The revolving shutter blades were trimmed down as close as possible, or near 78-degree angle of coverage.

The practice followed by Publix engineers was intelligent and rational. If the enlarged picture had an area approximately four times that of smallest one (old aspect ratio of 1.33 to 1), it was essential that a maximum amount of light be projected on the screen. Speeding up the intermittent movement for a longer exposure cycle gave an efficient level of screen illumination without increasing the light source.

The question of pulldown reduction time may be attacked in another way. It can be achieved by means of an additional acceleration mechanism acting upon the pulldown cycle of standard-size geneva star and cam and taking advantage of the well-known mechanical principle of "offset" drive —two displaced shafts linked by means of one universal joint. This gives a periodic acceleration to the cam pin at the instant of the pulldown cycle.

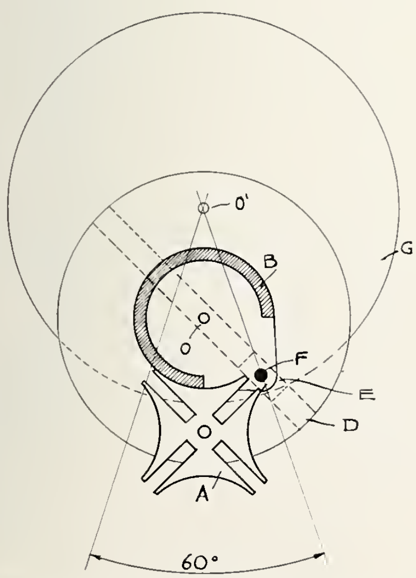


FIG. 11. Diagram of method for accelerating the pulldown phase of the standard-size geneva star and cam. This is regarded as the most promising method of obtaining a faster pulldown speed in modern projectors.

### *Accelerated Geneva Action*

In 16-mm work, the offset drive has been successfully employed in many excellent professional machines. However, in 16-mm work this method was chosen due to some inconvenience in the geometric cam action which would occur if a geneva with more than four slots were employed. One of the first to use this idea was Thomas Edison who designed a sort of "offset" system to achieve an accelerated motion in the pulldown cycle of the star wheel. The components tried by Edison were combined stages of accelerator elements. Two lever accelerators achieved a very short pulldown of only 32 degrees of cam action, leaving the remainder for projection or exposure time. However, this achievement was impractical.

Incidentally another mechanical expedient to accelerate the intermittent cam is to employ elliptical gears, but for many technical reasons, elliptical gears are not practical when interposed between the cam-pin shaft and constant velocity flywheel drive shaft. The offset mass of gears in motion with precipitous changes from positive to negative accelerations and the forces created by masses in high speed motion, introduced terrific vibration and shock incompatible with good projection operation.

It is an important fact that when gears are interposed between natural intermitent mechanical elements, a high degree of precision is required in machining the components. Any inaccuracy in the tooth shape creates oscillating hums due to the angular velocity change between gears. Therefore the gears must be cut with a high degree of precision to attain correct angular velocity.

However, in the case of accelerated mechanisms the film acceleration is perhaps the most important thing to

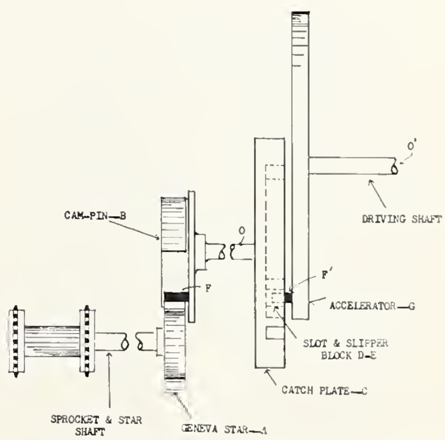


FIG. 12. Another view of the acceleration system shown in Fig. 11.

bear in mind. The amount of film to be accelerated is approximately 8" in length with a weight of about .004 pound. It is very important to know the maximum film acceleration rating and the pull in pounds in order to determine safety limits. The film acceleration and the sprocket traction upon the film perforations should be studied with great care. This applies with equal importance to the sprocket-base diameter, tooth design, etc. The film gate and tension pads are also important factors in calculating safe pulldown reduction. The pull in pounds should be limited to no more than one pound for a normal pulldown. In accelerated mechanisms, this safety limit may be overstepped with possible film damage.

Figures 11 and 12 show the basic elements for geneva accelerated movements. *A* represents the normal geneva star actuated by the cam pin *B*. This cam pin is attached to the slotted disk *D*, in which slides the metal block *E* actuated by the pin *F* in the offset disk *G*. *O* and *O'* are the axis of the cam pin and offset accelerator disk *G*, respectively, and illustrate in the diagram the amount of displacement between the driving shafts to achieve a 60-degree pulldown time.

### Reducing Pulldown Time

The result gives a final accelerated motion on the intermittent sprocket but with the advantage that the film is not pulled with instantaneous velocity. In 16-mm projection, double-stage accelerated mechanisms are often employed with an effective pulldown of less than 60 degrees without any perceptible damage to the film perforations. This accelerated geneva mechanism I consider an ideal method for reducing pulldown time in 35-mm professional projectors even though the mechanism is complex in mechanical design and fairly critical in dynamic balance.

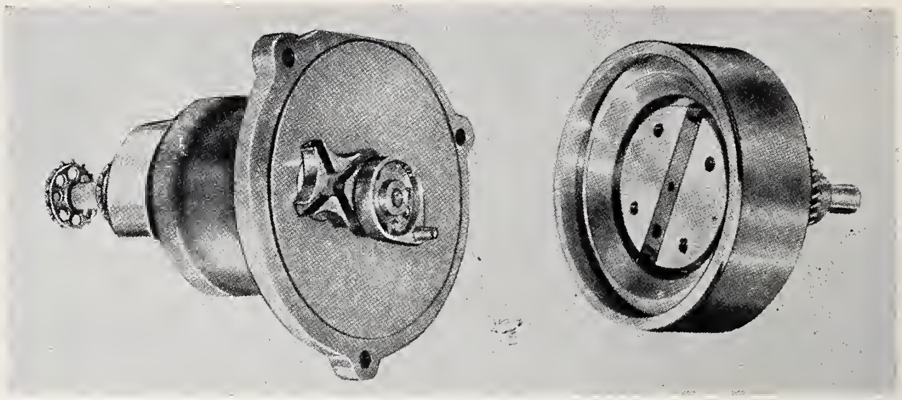


FIG. 15. Actual photograph of the Radion accelerated-pulldown projector movement. The slipper block is clearly visible at right. Offset position of the star wheel can be noted at left.

The French projector, Radion II, employs this accelerated geneva movement with compensated acceleration in the retardation phase of pulldown. Figure 13 shows three positions of the Radion II mechanism. The first position in the diagram shows the accelerated cam pin at the point of pulldown shift when it is at a relatively low velocity. In the second stage, the star wheel velocity has increased a little with relation to the accelerator speed rate, and in the third position the cam pin is at the maximum of acceleration phase with a retarded velocity in the film travel near the rest cycle.

The general arrangement of the accelerated Radion II mechanism is illustrated in Fig. 14. The conventional geneva star wheel (1) is actuated by the cam pin (8) which carries the disk (4) with an extended engaging pin (3). The pin (3) actuates the geneva star wheel and at the same time serves as a driven link between the cam pin (8-4-3) and the slide (6) which moves freely in the flywheel channel (7). The remaining mechanical components are numbered 2, 5, 9, and 10, and are, respectively, the intermittent sprocket, the cam-pin shaft collar, the flywheel integral with the driving shaft, and the driving pinion of the movement, etc. The entire mechanism is surrounded by the accelerator flywheel element where shocks and vibrations are neutralized.

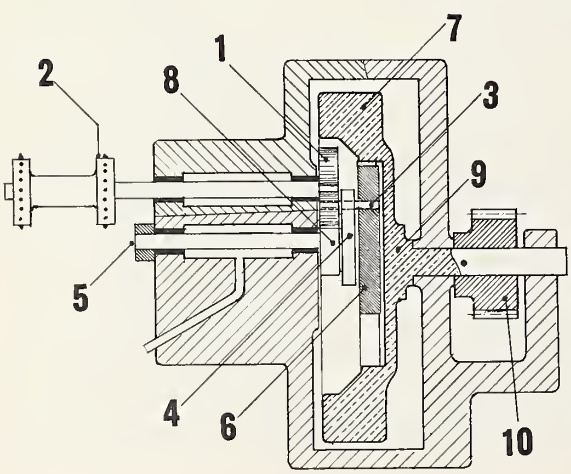



FIG. 14. Components of the Radion accelerated-pulldown 35-mm projector movement. The numeral 3 indicates the offset star-wheel. The sliding "slipper block" is indicated by number 6. Other numbered components are identified in the accompanying article.

### Radion II Mechanism

Figure 15 shows an accelerated movement and projector mechanism with guards removed showing the neat and compact design of this French projector movement. The manufacturer of the Radion II projector offers a true 70-degree accelerated mechanism that is not dangerous to film perforations and makes possible the very high light transmission of about 61.2%. At present, this is the only commercial 35-mm projector employing an accelerated movement with reduced pulldown time which the writer considers to be the only rational solution to increased light on the screen.

### Summary

To summarize this article so far, it can be said that there are three basic ways to speed up the geneva-star-wheel type of intermittent movement. They are:

(1) Increase the cam-disk diameter to get a 60-degree pulldown, following the old Cotinsouza design as employed by Pathe Freres, especially in their Model No. 3.

(2) The eccentric-star intermittent. This system has the advantage of design simplicity of the first solution. Also, it can be adapted to fit present 35-mm projector heads.

(3) The geneva movement with ac-

(*Continued on page* 34)

**IP makes a visit to check on an interesting sidelight: projection techniques and equipment in an astral dome.**


Cross-sectional view of the theatre in the Hayden Planetarium, New York City. Seating 750, the theatre contains special seating, with chairs specially designed to allow comfortable viewing upward.

# Planetarium Projection

## By ROBERT C. MacLEOD

NOT ALL of the projection profession is confined to showing Hollywood product, and if you're bothered by aspect ratios, etc., these days, consider operating fourteen projectors simultaneously, throwing an image on an elliptical dome 75 feet in diameter and 48 feet high—that's just one of the tasks of planetarian projection. Mindful of this little-publicized but important phase of the craft, IP went over to the Hayden Planetarium in New York City to look into what has sometimes been called one of the most dramatic of theatre productions.

There are seven major planetariums in the United States—Chicago, Philadelphia, Los Angeles, Pittsburgh, the University of North Carolina, San Francisco, and the Hayden Planetarium in New York City—all projecting sky-shows. A production at the Hayden requires the services of a lecturer and four technicians—projection techniques and special equipment all developed in the Planetarium's shop by Local 306 men under chief John Tuma.

### *The Dome "Screen"*

The diagram above shows the projection set-up at the Planetarium. The dome "screen," 48 feet up and 75 feet across, is constructed of stainless steel plates one-sixteenth of an inch thick, painted with standard white screen paint. The Planetarium utilizes a high fidelity multiple speaker sound system, and besides a rock cork lining in the structural dome, echoes and reverberations are kept to a minimum by the dome-screen itself: perforated over its entire surface with holes one-sixteenth of an inch in diameter and three-sixteenths of an inch apart.

The focal point of the projection system—practically the trade-mark of the Planetarium—is shown in Fig. 1. If you want to buy one, just ask for a Zeiss Optical Multiple Stereopticon Planetarium Projector. Actually a system of individual projectors, the 12-foot long apparatus can throw on the artificial sky any number of patterns of stars, sun, moon, planets, and the Milky Way for any place or time. Operated by small 3-phase AC motors, the device can turn about independently on any one of three axes at different speeds.

Inside each globe is a 1,000-watt bulb, and sixteen lens systems, each consisting of a condensing unit, a diapositive (a copper plate with accurately machined holes to represent the stars in a particular part of the sky), and a projector lens.

A feature of the Zeiss projector is a light cut-off: a cup-shaped, gravity-operated shield that slowly swings into the projection beam as the projector is tilted downward, keeping any direct light from the eyes of the audience.

### *Altec Console*

All of this is operated from a large electronic console designed and installed by Altec Service Corp., who also installed the electronic system in the theatre. A year in the making, the elliptically shaped instrument is 9 feet wide, and contains four control panels with four additional panels for future installations (Fig. 2). Containing about a mile of wire and a multiplicity of knobs, switches, and dials, the board is synchronized electronically to work in perfect coordination with the Zeiss projector and the sound system.

Operated by a lecturer-technician, the board controls: permanent special effects—comets, meteors, etc.; effects specifically designed for a particular performance; appearance and motions of sun, moon, stars and planets; celestial navigation effects; sky illuminations (sunset, sunrise, twilight, dawn); an electronic interval timer; alarm and emergency signals and lighting; public address controls; lecturer-to-booth com system . . . *ad infinitum.*

There are about two thousand possible combinations — or, as astronomer-technician-chief publicist James Pickering, one of the lecturers who have to cope with the console, maintains: "Two thousand possible mistakes, and I've probably made them all."

Although the Zeiss projector has been installed since the Planetarium's establishment in 1935, the Altec console is only two years old, having re-

FIG. 1. The Zeiss Planetarium projector.

placed the previous overburdened control board to provide more and better presentation effects.

But the console-projector system is but one phase of a Planetarium production. Slides, motion pictures, transparencies, a skyline silhouette all go to enhance a performance. In the projection room, projectionists Barney Kreps and Tom Smith handle the Ampex magnetic sound system, two Ampro 16-mm projectors, two turntables, a 7 x 7 slide outfit, the new Tuma-designed projection system, and whatever special effects are needed for each individual show.

FIG. 2. The Altec console, showing the projector control panel.

### *Multiple Speaker System*

Music, and any special sound needed, is played on the turntable and taken on the Ampex 400 recorder (see Fig. 3). Note that, in this case, the capstan is on the left, instead of the right-hand set-up prevalent these days. The system is by manual control, with the lecturer-technician cooperating in watching sync among projection, sound and dialogue. A multiple-speaker system behind the dome carries the sound from around and directly over the audience. (Not shown in diagram.)

When needed, two Ampro 16-mm projectors handle the motion picture assignment, and 7 x 7 slides and Kodachrome transparencies projected on the dome provide still effects. For example, the Christmas show at the Planetarium (shows change every month or two) used projections of Santa Claus, Christmas trees, a Biblical landscape, a city street panorama, music scores of carols, a Roman festival scene, constellation figure outlines, etc. The hour-long presentation is a busy time for both lecturer and projectionists.

A feature this year is the multiple projection system developed by chief John Tuma, and his assistant Stephen Ryan. This device, the first of its kind in any planetarium, employs fourteen color transparency projectors arranged around the 360-degree arc of the dome, and makes possible a wider range of colorful horizon scenes. The projectors are operated simultaneously from the projection room by a control panel. Previously, horizon scenes were presented by use of slide projectors located on the superstructure of the Zeiss projector, and each show was limited to one—or at the most—two horizon scenes. With the Tuma device, at least six are possible.

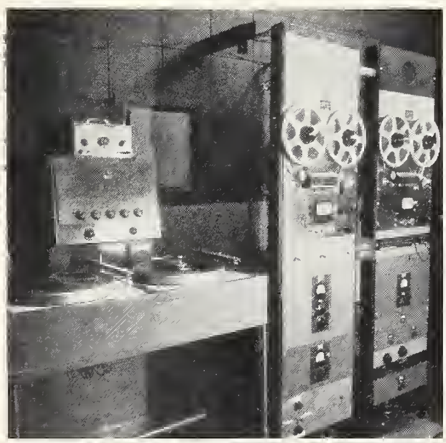


FIG. 3. Sound set-up in the Planetarium projection room, showing the two turntables and the Ampex 400 tape recorder.

In each projector is an aluminum wheel containing holders for six color slides, each slide constituting one fourteenth of a panoramic view. Blowers both in front of and behind the wheel are coolers. The projectionist can rotate the fourteen wheels in unison by pressing a button on his control panel, and bring any of six horizons into view. With this horizon illusion, the technician can provide the audience with the sense that they are watching the sky from whatever vantage point is wished, whether from a square in ancient Rome or from the surface of the moon. The projectors are housed in black light-proof boxes sound-proofed with fiberglass insulation. Six colored button-lights on the control panel inform the projectionist of scene-identity and sync.

### *Improving Techniques*

With the exception of the standard lamphouse assembly, the entire mechanism was constructed by Tuma and Ryan in the workshop in the basement of the Planetarium. The Planetarium projection staff maintains full facilities for development of projection techniques for their presentations, and work in the shop goes on full time. Right now the staff is going ahead improving the projectors to the point where sixteen horizon scenes will be possible.

This constant improvement of projection techniques has deservedly earned the Planetarium a reputation for colorful, informative and dramatic presentations. To projectionists who live in or near those cities that have major planetariums, IP suggests that a trip to one would be a more than interesting way to study an off-beat part of the projection craft.

## Suspend Historical Project

Operations on a project to reclaim more than 1,000,000 feet of early motion pictures printed on paper (IP, Aug. 1955) have been suspended due to lack of funds, the Academy of Motion Picture Arts and Sciences has announced. Over a period of eight years the Academy has invested $125,000 in the project, undertaken originally at the request of the copyright division of the Library of Congress. An additional $250,000, presumably having to come from private sources, is needed to complete the work.

The film, printed on paper in accordance with early copyright practise and not meant to be screened, is considered to be a "fantastic collection of Americana." It is expected to deteriorate within the next two or three years.

## Dividend Voted By Eastman

A wage dividend of $35,700,000 has been voted by directors of Eastman Kodak. The dividend, based on cash dividends declared on common stock during the year and individual earnings over the past five years, will be shared among 51,000 Kodak employees. To be paid next March, the dividend is the highest amount authorized since the plan was begun by the company 44 years ago. It will be paid in addition to regular wages and has no effect on wage rates.

# Is Magnetic Reproduction Worthwhile?

**A British engineer takes issue with some of the statements about magnetic sound made by Robert A. Mitchell in recent IP articles.**

*To the Editor of IP*:

I have read with interest Robert Mitchell's second article on magnetic tracks published in the September issue of IP, but I cannot agree with all the statements he makes, nor with all his opinions. He claims that the frequency range offered by magnetic tracks is no greater than with all-optical tracks. This is entirely contrary to normal experience. Most of the major film producing companies employ low pass filters in their photographic recording channels and cut off at 8000 cycles per second or lower. Furthermore, the standard reproducer characteristic normally used on photographic sound reproduction equipment has a high frequency roll-off leading to an attenuation of the order of 18dB at 8000 cycles.

This attenuation of high frequencies in both recording and reproduction is absolutely essential if the distortions, *etc.*, inherent in the photographic recording process are to be maintained at an acceptable low value. This applies when good release prints are involved. If the release prints are poor, as they commonly are, then even with this poor high frequency response, the distortions are at an intolerably high level.

Magnetic recording, on the other hand, can, and does, generally maintain a reasonably flat frequency characteristic up to about 10,000 cycles. Also, contrary to Mr. Mitchell's statements, the signal-to-noise ratio obtained with magnetic recording is greater than that normally obtained with photographic recording.

He is also quite wrong in saying that at lower frequencies the CinemaScope method excels optical sound as regards signal-to-noise ratio. If anything, quite the reverse is true, because at low frequencies the output from magnetic tracks is low, and at the lower frequencies, the signal-to-noise ratio is poorest.

A good signal-to-noise ratio is only obtainable with photographic recording when the print is new and the track completely free from scratches, dust and other imperfections which it seems naturally to collect during its life. The signal-to-noise ratio of magnetic tracks, on the other hand, does not normally deteriorate with use.

There can be no doubt that, as judged by the experience over the last few years, the quality of the sound in the theatre from magnetic tracks is appreciably better than that from optical tracks, but whether this improvement in quality is in fact sufficient to justify the extra expense is another question entirely.

I must support Mr. Mitchell's condemnation of the proposed combination print. The results from this would be very poor indeed. The narrow optical track would be most unsatisfactory.

A. S. Pratt
Chief Engineer
Rank Precision Industries, Ltd.
London, England

## Robert Mitchell's Reply:

MY SINCERE thanks to Mr. Pratt of the Rank Organization for calling attention to my error in stating that the lower frequencies in the CinemaScope magnetic method are freer from distortion and noise than in optical sound. This statement arose through a consideration of the output characteristics of the magnetic head, and did not include frequencies below the 50—60 cycle range. However, if nothing below 40, or even 30, cycles is considered, there is not too much difference in reproduction between CinemaScope magnetic and standard optical sound.

High-frequency noise and distortion in optical tracks seems to be largely dependent upon the method of recording used, the variable-density method suffering the most. It is a fairly simple matter to keep an optical soundhead functioning efficiently, however, and in actual theatre practice high-frequency response from modern optical tracks of the best quality is often superior to that obtained from CinemaScope tracks.

To clarify the data employed, a number of frequency-response charts are reproduced herewith. If anything, these represent CinemaScope magnetic sound at its best. The first chart is included to disabuse readers of the mistaken notion that any slight superiority of one system over the other (each *at its best*, of course) can be detected by *listening* to the reproduction. All is at the mercy of the loudspeakers.

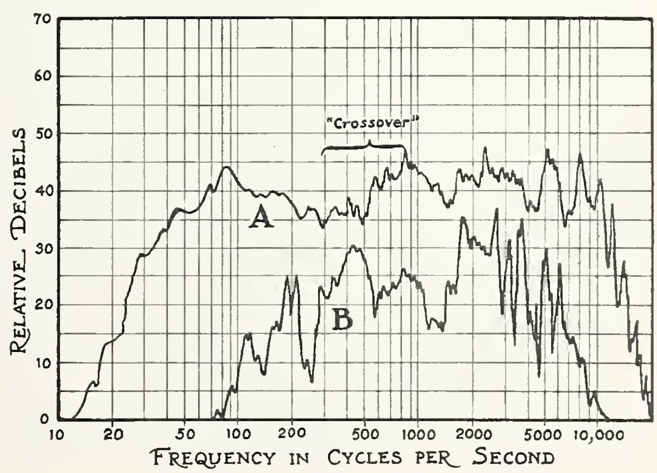
### *Loudspeaker Limitations*

As is shown in Fig. 1, any sound-reproducing system is at the mercy of the loudspeakers used with it, for all speakers produce more or less distortion of the linear type known as "speaker coloration." The curve marked "A" illustrates the overall frequency response of a modern "woofer-tweeter" system having a crossover range of 300 to 800 cycles. This speaker combination gives an acceptably level response between 50 and 10,000 cycles.

The curve labeled "B" shows, by way of comparison, the average response characteristics of a single dynamic speaker commonly used for theatre sound reproduction in the 1930's. Note the restricted range (200—6,000 cycles) and the "peaky" response which results in unnatural sound. The peaks in the 3,000—6,000 cycle range are caused by cone reso-

(*Continued on page* 28)

FIGURE 1



Motion Picture Film Department
EASTMAN KODAK COMPANY
Rochester 4, N. Y.
Branches at strategic centers. Inquiries invited.
East Coast Division
342 Madison Avenue
New York 17, N. Y.
Midwest Division
130 East Randolph Drive
Chicago 1, Ill.
West Coast Division
6706 Santa Monica Blvd.
Hollywood 38, Calif.

The function of this department is to provide a forum for the exchange of news and views relative to individual and group activities by members of the organized projectionist craft and its affiliates. Contributions relative to technical and social phases of craft activity are invited.

# *In The* SPOTLIGHT

THE IATSE recently concluded a two-year pact with 13 major distributing companies which provides for a pension fund for more than 6,000 film exchange employees in 34 key cities throughout the United States. Blanket wage increases of $3.75 per week, retroactive to December 1 last, severance and seniority provisions, and extra vacation benefits are included in the new agreement.

The employers will contribute to the pension fund established by this agreement six cents for each hour worked, up to straight-time maximum of 37½ hours per week. These payments will augment the weekly wage increases by $2.25 per full-time employe. The fund will be administered jointly by the IATSE and the employers. Parties to the agreement are Warner Bros., National Film Service, RKO, Paramount, United Artists, Columbia, Republic, 20th Century-Fox, Universal, National Screen Service, Loew's, Allied Artists, and Buena Vista.

Special provisions still remain to be worked out with three of the companies —Loew's, RKO, and 20th Century-Fox— who had pension plans of their own prior to the new industry-wide agreement.

In addition to financial benefits, the new contracts provide for an increase in the maximum annual paid vacations, previously two weeks, to three weeks for employes who have worked 15 years or more for one company.

Previously, the top severance allowance was the equivalent of seven weeks' pay. This has been upped to eight weeks' pay after 16 years of employment, nine weeks' pay after 18 years, and 10 weeks after 20 years.

The new seniority clause provides that "all layoffs and all rehiring following layoffs shall be made according to seniority within each of the respective exchanges covered by the agreement, provided that the senior employes shall, in the judgment of the employer and the union, have the necessary qualifications, experience, and ability to perform the available work. In the event of a dispute, the matter shall be referred to the General Office of the IA or the home office of the distributor involved."

Alliance negotiations were conducted by a committee appointed by President Richard F. Walsh, consisting of Harland Holmden, General secretary-treasurer; Louise Wright, IA ninth vice-president; Walter F. Diehl, IA representative; and Richard Scott, special IA representative.

**Since it would be rather difficult to personally acknowledge all the Holiday messages we received from our many friends from all parts of the world, we take this means to say "thank you" to our readers for their good wishes.**

• The award of a gold life membership card to Earl E. Ross, business representative, was one of the high spots at the recent anniversary celebration of Local 620, Pontiac, Mich. The presentation was made by John Shuff, IA 8th vice-president, one of the guests of honor. Ross has been active in union affairs for many years and has held important posts in various labor organizations. He served as vice-president of the Michigan State Alliance for 20 years, and for many years held the office of president of Pontiac and Oakland (Mich.) County AF of L. He has been employed by Butterfield Theatres, Inc. for the past 27 years and presently is projectionist at the Oakland Theatre in Pontiac.

• A new contract ended the six-month strike by Local 430, Eureka, Calif., against a number of theatres in its jurisdiction. The contract covers the Midway Drive-In, Eureka, and Rialto Theatres in Eureka; the Minor Theatre in Arcata, and the Bel-Air and Humboldt Drive-Ins in Fortuna. One of the provisions included in the new agreement calls for seven days sick leave with pay. John Forde, IA representative, negotiated the contract for the Local.

• The Theatrical Federation of San Francisco, AF of L, which is composed of 15 unions in the entertainment field, sponsored a mammoth show on New Year's day for the prisoners at San Quentin. Top talent from San Francisco Bay area amusement spots, and craftsmen from the various Local Unions all took part in this presentation. William Van Ornum, member of San Francisco Local 162, producer of this year's show at San Quentin, has devoted much of his free time during the past 15 years to setting up these presentations. Assisting Van Ornum were Charles H. Kennedy, Musicians Local 6; Frank O'Leary, IA Local 16; Phil Downing of Variety Artists, and William P. Sutherland, secretary of the Theatrical Federation, members of the arrangements committee.

## 25-30 Club Notes

• Morris J. Rotker, senior past president, was the mysterious "Mr. X" in whose honor the Club tendered a dinner last month at the famous Lobster Restaurant in New York City. Invitations stated that

John A. Shuff (second from left), IA vice-president, presents gold life membership card to Earl E. Ross, business representative for Local 620, Pontiac, Mich. William Spencer (extreme left), and Charles H. Bonham (right) are interested spectators.

the party was to be given in honor of a Mr. X, whose identity was jealously guarded until the end of the evening. When Morris Rotker was finally identified as Mr. X, he was completely overwhelmed. There had been much guessing and kidding during the evening about who this Mr. X might be and when the veil was finally lifted all agreed that no member of the Club was more worthy of the honor than Rotker.

Morris J. Rotker

Allen G. Smith, honorary member of the Club and New York City branch manager for National Theatre Supply, presided at the dinner in his usual masterly fashion. There were about 70 guests at the affair including the following New York Local 306 officials: Herman Gelber, president; Ernie Lang, recording-secretary; Izzy Schwartz, financial-secretary; Harry Garfman, Brooklyn business representative; and several members of the executive board. Honorary members Paul Reis, National Carbon Co., and Johnny Kohler, projection supervisor for Loew's, were also present.

• Another feather in the cap of George Schaffer, business representative for Los Angeles Local 150 is the recently signed contract covering the Todd-AO presentation "Around the World in 80 Days," scheduled to be shown at the Cathay Circle Theatre in LA. The contract calls for 4 regular projectionists to cover two performances per day, with two projectionists working each performance. Each man will receive $28.70 per performance, with a minimum pay of $172.20 per week. It is interesting to note that this contract is based on a "reserved seat policy," eliminating shift hours. Also, the hourly pay has been increased an additional 40 cents over the previous agreement covering the showing of "Oklahoma" on Todd-AO equipment. One hour preparatory time is included in the regular performance time. Overtime will be paid at the rate of $6.15 per hour. The agreement also provides that the chief projectionist will receive $25 per week above the basic weekly scale.

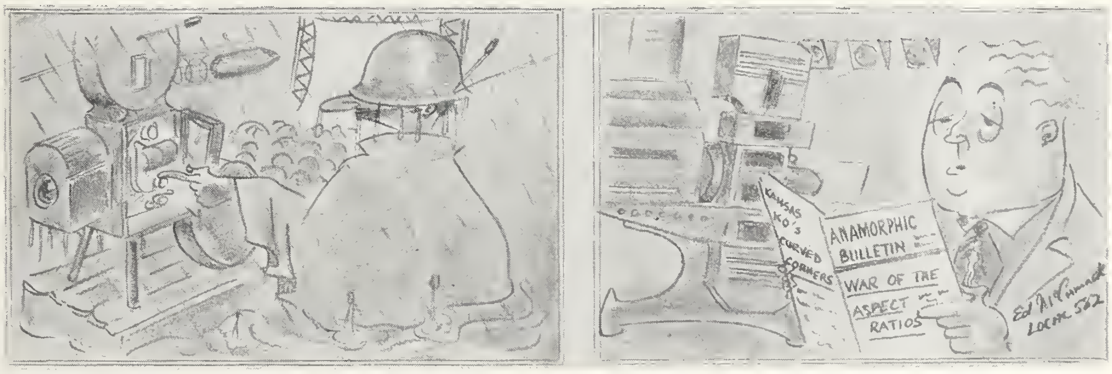
• For the first time in its history, Local 415, Tucson, Ariz., tendered a breakfast in honor of a theatre manager. The recipient of this honor is Fred McSpadden, manager of the Fox Tucson Theatre, who was presented with a desk clock by the Local in appreciation of "15 years of pleasant association." The breakfast was held at Paulos Restaurant in Tucson and was attended by members of the Local and other theatre managers. Al Runkle, president of 415, and Tom Doherty, business representative, were among the union officials lauding McSpadden. Runkle pointed out that the theatre manager was not honored "for having contributed any one big thing but for having performed countless small services for the industry and the community."

Fred McSpadden (center), manager of the Fox-Tucson Theatre, holding the desk clock presented to him by the members of Tucson Local 415. Shown here with him are Al Runkle (left), president of the Local, and Tom Doherty, business representative.

# Family Album

The gallery at the left is a sad saga from Ed McCormack, Local 582, Brantford, Ont., Canada, who, we trust, is also going down fighting.


LEFT: 1896—Great Grandpappy. Lanternist to the crowned heads. Asphyxiated 1898. CENTER: 1910—Grandpappy. Bioscope booth 1912. Cremated in full dress. RIGHT: 1929—Poppa. Removed in straitjacket, 37th week of *Jazz Singer*.




LEFT: 1945—Brother Louis. Soft number with U. S. O. RIGHT—1956—Junior (still wet behind the ears). You think YOU got troubles????

Readers' questions are invited.

# Projection CLINIC

## Care of Old Lenses

OLD-STYLE uncoated projection lenses are inferior in performance to coated lenses, which provide more brilliant pictorial contrasts and better light transmission. Nevertheless, a few theatres have retained their old lenses, using them for either normal-format projection or as CinemaScope prime lenses.

These older lenses do not have sealed mounts, and therefore may be completely disassembled for the removal of dust and oil which may have seeped inside the barrel and between uncemented lens elements.

Now, many projectionists are aware that achromatic telescope objectives of large diameter should not be screwed up tightly in their threaded "cells," but held with just sufficient play for a slight rattle to be heard when gently shaken. By this expedient, mechanical strains in the lenses which would distort or blur the image are prevented. Loose mounting also allows for the natural expansion of the glass components under the influence of heat.

Should the lens elements of old-style projection lenses also be held just perceptibly loose in their mounts? The answer is a definite *no*: they should not be so loosely mounted that they rattle. On the other hand, the threaded lens-retaining rings should never be screwed up so tightly that the two lenses of an achromatic doublet (cemented or uncemented) are "squeezed" and distorted out of true shape.

Screw the retaining rings only to the point where they *just begin* to "bring up" against the lenses—no more.

### PATIENCE, PLEASE . . .

Robert A. Mitchell's Manual of Practical Projection will be off the press about mid-March. IP has been offering this must-reading at a special pre-publication price of $4.50 per copy—but note that word *pre-publication*. That means that the offer applies only to cash orders received *before* the book is off the press. To those of you who have already sent in your checks, many thanks, and you'll get your copy directly the book is out. For those who haven't ordered as yet, please remember that on publication date the cost of the book reverts to its original publication price of $6.00 per copy.

## Inspection of Prints

FILM may be damaged in many ways. Most of the causes of print damage are beyond the projectionist's control; but we must face the fact that injuries, some of them irreparable, can be inflicted by improper handling in the projection room. And the term "improper handling" may be extended to include the use of worn and maladjusted projection equipment.

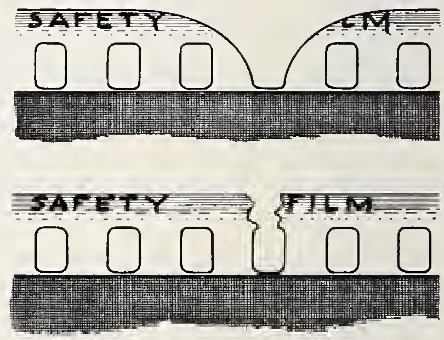
It is unusually easy to distinguish the effects of normal wear from the inevitable results of injudicious and careless treatment of film. The present lack of adequate inspection of prints in so many film exchanges, defective splices made by inexperienced examiners. and the continued use of bent reels and damaged shipping cases all contribute to film mutilation.

The projectionist has learned from experience to look for broken and torn edges on prints that arrive at the theatre in shipping cases so badly crushed that they have to be opened with the aid of a hammer, and the reels extracted with pliers. Boxes of film are often handled roughly in railway stations, so it isn't surprising that the reels and cases get battered up after years of use. What really embitters the projectionist, however. is the refusal of many film exchanges to repair or replace "dished" shipping cases and "sprung" reels.

Exchange "inspectresses" wear cotton gloves while inspecting prints, which may may be one of the reasons so many defective splices apparently escape their attention. Most projectionists use their bare hands to locate defects which might cause film breaks and stripped gears in the projectors.

There are many defects to look for. Torn perforations and small nicks in the edges of the film demand attention. Rough and nicked edges may be corrected by trimming the edge of the film with scissors, and tears extending from a sprocket hole to the edge of the film are sometimes remedied by "notching." Perforation breaks involving only one or two sprocket holes may be "Notched," or smoothly cut out with scissors. When three or more perforations are damaged, it is best to cut the film and make a splice.

The secret of notching film successfully is to make a smooth rounded cutout. Poorly made notches may catch and tear on the upper guide roller, on the sprockets, or on the flanges of a reel. Certain competent authorities, in fact, condemn the practice of notching torn sprocket holes. The writer speaks only as a projectionist who occasionally notches film and has never had a film break from the cause.




"Notching" a perforation, as shown at the top of drawing, is an emergency method of repairing the type of torn perforation shown at bottom.

## Splicing Procedure

SPLICES found in theatre-release prints are a frequent source of annoyance to the projectionist. Exchange-made splices are very good as a rule, but they are sometimes too weak to be safely projected. The problem of weak splices may be traced to a fear of using an adequate quantity of film cement. Film experts have often cautioned against applying *too much* film cement, and this advice has frightened inexperienced exchange inspectresses into using too little. Too much cement may weaken the film at the edges of the splice, but too little results in a splice which comes apart at the slightest strain. The strength of a splice in the perforation-margin area is the most important factor of all, yet many exchange-made splices have a tendency to lift at their ends. Too little cement applied to this one region is one cause of the trouble; inadequate scraping of the film stub is another.

The first and most important step in making a satisfactory film splice is the scraping of the stub. Not only must all emulsion be removed from the area of the contact, but also the thin binder layer

of clear gelatine. It is best to roughen slightly both contact areas—the scraped stub and the base side of the butt stub.

Most projectionists employ "wet scraping." The gelatine-emulsion coating is first moistened to facilitate removal, and the actual removing accomplished by scraping the stub with a razor blade. The trouble with this method is that it is difficult to get all the emulsion off in the perforation margins without tearing the film. Dry scraping with a medium grade of sandpaper gives better results if care is exercised not to scrape the stub too thin. It takes practice to know just when to stop scraping.

The dry-scraping method works best when the sandpaper is backed by a small wooden block to hold it flat and insure even scraping. Small scraping blocks with the sandpaper glued to them are readily available. There is no discernible basis for the criticism that the use of sandpaper for dry-scraping film stubs leaves gritty particles which will injure projectors. Splices made by this method are wiped with a clean cloth like other splices, at once removing any dirt which may accidentally adhere to the film.

### *"1-Hole" Splices*

Every projectionist should make "1-hole" splices with the stubs cut straight across. The ends of the stubs should never be mitered, for the greater the contact-area in the perforating margins, the better the splice will hold. "Hairline," or negative-type splices should not be made in release prints unless a "hot-weld" splicing machine is used. Curved splices are tabu. The base side of the butt stub (cut on the frame-line) should be wiped free from oil or, preferably, slightly roughened to insure good solvent action of the film cement.

No time should be lost between application of the cement and joining the stubs under firm, even pressure. The splice is permitted at least 10 seconds, and not more than 15 seconds, for the splice to set. Then the pressure clamps of the splicing block are opened and the finished splice wiped laterally (across the film) with a clean cloth to remove excess cement.

A film splice is actually a weld, and a film cement is accordingly a solvent for the film base, rather than a mere glue. The two film surfaces dissolve to some extent and melt into each other. A solidly made splice should last for the life of the print, provided, of course, that the perforations are exactly registered and the edge of the film smoothed, if necessary, to prevent catching and tearing in the projector. It often happens that the width of new film is greater than that of old film; and the joining of dissimilar film widths leaves a small protrusion at the edge of the splice.

**Very often the oldest equipment in the projection room, the motor generator, may require adjustment for best performance.**

# Increasing Efficiency of Motor Generators

By JOSEPH F. HOLT

Member, IA Local 428, Stockton, Calif.

IN A PREVIOUS article certain specific steps were suggested to determine the overall performance of the associated cabling in projector lamp circuits. Another important link in the chain is the DC source, which is almost sure to be a motor-generator set, a dry-disc rectifier, or a high-vacuum tube unit.

The motor-generator is far and away the most popular with projectionists and perhaps such installations outnumber the other types. Regardless of the number of motor-generator sets, it is beyond doubt that large numbers of these machines are being called upon to deliver increased amperages for large screen projection.

Brick-and-mortar theatres built in the twenties were frequently opened with lamps utilizing a rotating uncoated "projector" positive. As the faster projector lenses were introduced and the Suprex lamps were introduced and improved, many theatres converted to the more economical lamps, at the same time retaining the motor-generator sets with output voltages far in excess of the requirements of the Suprex lamps. This presented no real problem, for additional grid resistance was used to provide the required voltage reduction.

### Extending Usefulness

All of this is somewhat historical, and in view of the current needs for greater efficiency, the generator should be viewed in the light of present demands. We propose to indicate some checks and adjustments which can go far toward extending the usefulness of motor generator sets.

Figure 1 shows in cross-section the field coils, brush rigging, and commutator bars necessary for our discussion. The reader must bear in mind that the drawing is incomplete and general in order to be applicable to most types and manufacture of motor-generator set.

When larger trims and general equipment overhaul were sought after, numerous commutators were removed and lathe-turned. This procedure is not open to adverse criticism in itself, but certain intolerable end effects can be introduced. Consider the relation of intersectors drawn in Fig. 2, which shows the departure from the "field neutral" line, drawn dotted in the figure. So long as brushes are mounted obliquely with respect to the commutator, a change in commutator diameter must result in an effective shifting of the brushes from the plane of commutation.

In connecting the brush shift with the effects upon output voltage, let the reader refer again to Fig. 1. Here we have drawn the plane of commutation as a dotted line under the single brush selected for special study. We have also termed the commutated point as a "field neutral," for the point referred to is actually a "no-man's land" in which the magnetic fluxes produced by the North-South shunt fields, the commutating field (or interpole), and armature currents have minimum interaction.

Generators used for projection lamps offer unusual load situations, for they may be considered as running at 100% load constantly, with 200% load occurring at each changeover. The design of the compounding of the generator is naturally a concern of the generator manufacturer, and most of them have done creditable jobs of producing load versus voltage curves which exhibit a flat or slightly overcompounded characteristic.

But what if, after the commutator has been reduced considerably in size of diameter, the generator exhibits

(*Continued on page* 31)

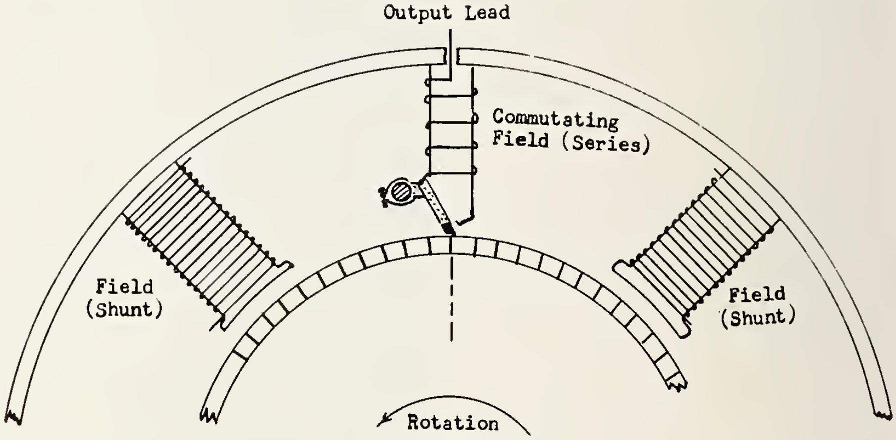



FIGURE 1.

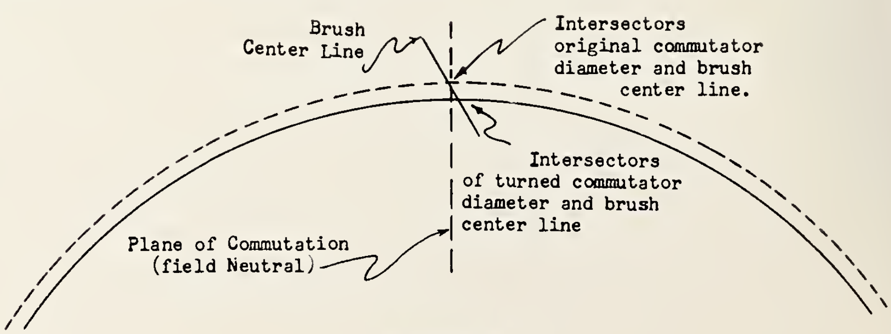



FIGURE 2.

# PERSONAL NOTES

J. F. "Jack" O'Brien, formerly manager of the theatre and sound products department of RCA commercial electronics products, has been appointed manager of RCA's northeastern region by R. W. Saxon, director of regional operations. O'Brien, well-known throughout the industry with 25 years' sales association with RCA, will make his headquarters in Boston to work closely with customers, distributors, and RCA field representatives.

In 1954 Mr. O'Brien received the highest honor for salaried employees, the RCA Victor Award of Merit. A member of the Variety Clubs, he is also active in the Society of Motion Picture and Television Engineers, Theatre Equipment and Supply Manufacturers Ass'n, and Theatre Owners of America.

* * *

Ed Lachman, American distributor of Lorraine carbons, has just returned from a European trip during which he visited the laboratories and manufacturing plant of Lorraine in Pagney, France. While in France, Lachman addressed the annual meeting of French, Italian and German Lorraine Carbon representatives on the latest arc-lamp developments and drive-in theatre equipment trends in the United States. A feature of the meeting was the introduction of new projector carbons designed for the high-powered arcs needed in wide-screen projection.

Ed Lachman

* * *

Bernard Sholtz, known to the industry as "Barnie," has joined Altec Service Company as special sales representative. This marks Sholtz's re-entrance into the field he retired from in 1954, having been district manager of theatre equipment sales for RCA for many years. Accorded a roving commission to represent Altec throughout the United States, Sholtz brings a wealth of experience garnered since he first entered the industry in the distribution department of Selznick. Associated for a time with Warners and Fox, in 1929 he was appointed sales manager of the first sound-on-film device, RCA's Photophone. With RCA until his retirement in 1954, in 1955 he toured Latin America to get a first-hand study of sound service and equipment in South American theatres.

## TRANSMITTING POWER TO ARC LAMPS

(*Continued from page 10*)

consideration when the cables are located inside combustible wooden walls, as is likely the case in most of the older theatres having a generator room in the cellar.

### *Capacity of Wiring*

The power-conducting capacities of cables having different types of insulation are rated differently by the National Board of Fire Underwriters. The differences are small, however; and the following wire sizes for source-to-arc conductors are representative of the recommendations of electrical authorities:

| UP TO: | B & S GAUGE WIRE SIZE |
|---|---|
| 100 amps. | No. 3 |
| 125 amps. | No. 2 |
| 150 amps. | No. 1 |
| 175 amps. | No. 0 |
| 200 amps. | No. 00 |

It must be repeated that one 2-wire cable serves only *one* arc lamp, hence no matter whether one motor-generator set or two separate rectifiers are employed, there must be two such 2-wire cables for the usual 2-projector installation. Similarly, two ballast rheostats are needed for a 2-projector installation when the arc-power source is a generator, each being connected in series with the arc it serves.

The exact position of the ballast in the line (near the generator, near the lamp, or midway between them) does not matter. It is customary, however, to locate the ballasts in the generator room. (Certain motor-generator apparatus, such as the Motiograph 70/-140-ampere "Hi-Power," has built-in ballasts resistors in the base of the machine where they are effectively cooled.)

Voltage drop in the source-to-arc transmission line is not too important when generators are used, but wastes power when rectifiers are used. As stated before, line drop may be compensated by reducing the amount of ballast drop, but this expedient is necessary only where the transmission line is very long.

The transmission wires should always be checked for heating whenever the arc current is increased for wide-screen projection. This may seem like unnecessary advice; but we have observed cables so hot that they were dangerous. Wiring of inadequate size means trouble if overloaded! Grasp the wires with the hand after a 20-minute run. They may normally become just perceptibly warm: if hotter than this, the insulation may be expected to char and break down completely in a matter of days or weeks.

Included in the transmission line are the flexible asbestos-covered stranded wires which connect the arc lamp to the cable outlet. This connection should be made by joining the wires, *not* by means of a plug! If, however, the wires are twisted together carelessly, sufficient heat may develop to melt the solder and oxidize the copper. The projectionist should assure himself that this and all other connections are sufficiently solid to remain cool at all times.

If the connections have to be remade, use the standard American wire joint (Fig. 4) and cover each joint heavily with a good grade of solder. Plain solder with "Nokorrode Paste" as the flux is recommended: acid-core solder should not be used. The soldered joints should be insulated with a glass-cloth tape such as "Scotch" Electrical Tape No. 27.

Careful attention should also be given the generator or rectifier connections and those at the ballast rheostats, the arc-lamp table switches, and the lamp terminal blocks. As a rule, these connections are made with binding posts and lugs. If made tightly when the equipment was installed, they will remain electrically satisfactory for many years. This is true even of connections so old that it is difficult to loosen the binding-post nuts. Loose connections, on the other hand, develop heat, transmit the current in an erratic manner, and gradually become worse through increasing corrosion.

### *Electrical Connections*

To make a good connection, wipe the lug with crocus cloth to remove tarnish and tighten the nut very firmly. Severely burned lugs should be replaced with new ones. Be sure that the insulation on the wires is in good condition, and that no bare places expose the copper wire where it may accidentally cause short-circuits or grounds.

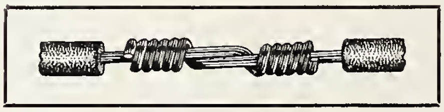


FIG. 4. American wire joint recommended for arc-lamp cables.

The same advice holds good for the connections inside the lamphouse. Look them over very carefully, examining them for evidences of corrosion and tightening them when necessary. All of the internal connections carrying arc current should be remade every time the carbon jaws or contacts are replaced, or whenever it is discovered that the heat of the arc has harmed the insulation or oxidized the copper strands of flexible wires. The writer has found lamphouse wiring so badly oxidized that the copper strands crumbled when rubbed between thumb and forefinger.

In an effort to avoid a variable voltage drop along the length of "Suprex" copper-coated positive carbons, many projectionists have added a shunt to connect the positive carbon holder with the positive V-guide. This expedient is of somewhat doubtful value except when thinly plated positives are burned slightly above their maximum current rating. Even so, simplified-HI positive guides "burn" rather rapidly when a shunt wire is used. The corrosion may be due either to electrolytic action or to the heat generated by the passage of current from the guide to the carbon.

### *Cleaning Carbon Jaws*

It is seldom necessary to file the carbon-gripping surfaces of the carbon jaws or holders. Careless filing of these surfaces will do more harm than good by destroying their flatness and by roughening them with multitudinous fine scratches. Roughening metal oxidizes or "burns" much more rapidly than smooth, polished metal. A dull brownish film on the carbon-contacting surfaces of low-intensity and simplified high-intensity carbon jaws is normal, and should not be removed.

If ever it becomes necessary to burnish the carbon-holder surfaces in lamps of these types, wrap crocus cloth around a narrow file or straight, square rod of steel and polish carefully. If these surfaces have become corroded and pitted, smooth them with a fine file, then burnish, first, with 00 sandpaper wrapped around a file, then with crocus cloth. Avoid the use of emery, particles of which may fall upon the

mica insulation and cause short-circuits.

The positive contacts of rotating-carbon HI lamps seldom need burnishing. The rotating, slowly advancing carbon, itself, has a polishing action. It is rarely necessary to do more than clean the contacts with a dry rag or a small stiff-bristled brush. If polishing ever becomes necessary, wrap crocus cloth around a length of slightly undersize carbon (such as a negative carbon).

Just as LI and simplified-HI ("Suprex") lamps require cleaning and lubrication of the carbon-feeding screws, so do regular HI lamps require cleaning and lubrication of the carbon-rotating and feeding mechanism. All parts of the burner mechanism should be periodically examined for corrosion and replaced when necessary.

### *Maintaining Switches*

Switches are another important link in the power-transmission chain. Heavy lamp-table arc switches seldom give trouble. It is always a good idea to keep them clean, of course, and the contact jaws must be kept tight enough to prevent heating and burning when the switch is closed.

Relay-type switches, commonly used for switching on rectifiers as well as motor-generator sets, are usually built for years of dependable action without attention. At long intervals, however, all 220-volt relay, or solenoid-type switches should be examined for burned contacts due to "arcing." Accumulations of dust should be carefully brushed out, and a drop of oil placed upon the switch-blade pivots.

When working on 220-volt switches, be absolutely certain that the power input is shut off at the service switchboard (usually positioned near the electric company's kilowatt-hour meters). To make doubly sure that the switch is "dead," apply the prods of a neon test light to the switch contacts. Even 110 volts may be fatal in cellars having damp floors!

Faulty action of a 3-phase switch usually involves only one of the phases. But if one wire of the 3-phase circuit is dead, two of the three phases are cut off! A rectifier or motor-generator designed for 3-phase operation works very poorly, or not at all, on single-phase current. If the light output of the arcs drops very sharply and begins to flicker badly, shut the apparatus off to avoid serious damage.

When you know for sure that all the components of your arc-power transmission line from the AC input to the arc lamps arc in perfect electrical condition, you will have less need to worry about the quality of your screen light. Most important, a careful check of your power system with adequate correction of minor faults may actually make your screen illumination noticeably brighter and steadier!

## IS MAGNETIC REPRODUCTION WORTHWHILE?

(*Continued from page* 17)

nance, and impart a characteristically "tinny" tone to the reproduced sound.

In Fig. 2 the shaded portion of the chart represents the available sound-current output of a modern theatre amplifier. Note that sufficient leeway is provided in both the low- and high-frequency regions of the sound spectrum for considerable latitude in adjusting the response in these regions quires special correction of the frequency response.

Figure 3 shows that the "signal" recordable on uncompensated optical soundtracks (curve A) is fairly level from 0 to about 2,000 cycles, the point where progressive high-frequency attenuation, due to the width of the 0.5-mil recording slit, results in a loss of about 5 decibels at 5,000 cycles, the "peak region" of 4,000 cycles. This peak is produced by the recording characteristics of the magnetic stripe and by the width of the magnetic gap.

### *Obtaining Level Response*

A fairly level signal strength in the main 100-8,000 cycle band is obtained in both types of track by special pre-amplifiers which raise the weak regions and flatten the peaks. Different types of optical recording require different frequency corrections; and if it is de-

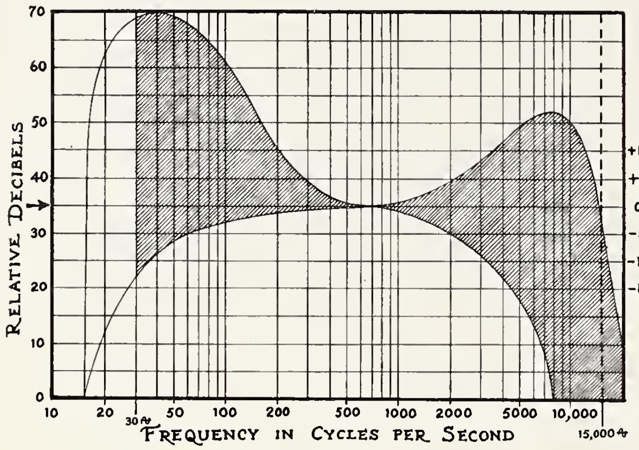



FIGURE 2

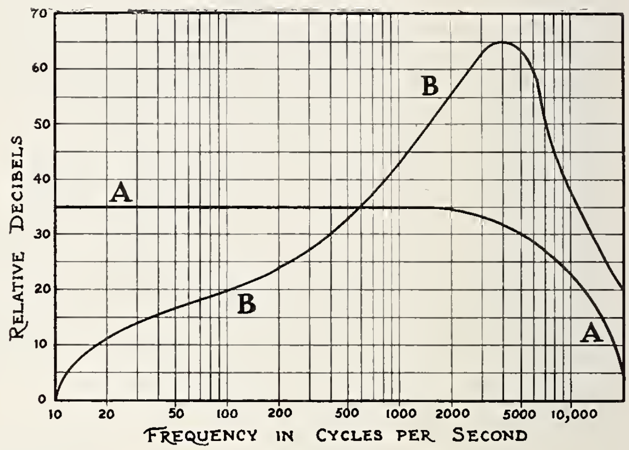



FIGURE 3

to suit the characteristics of the sound-head (optical or magnetic), the peculiarities of the speakers, and the acoustics of the auditorium.

Although this amplifier permits a level output from 30 to 15,000 cycles (see the horizontal line marked "0 db" on the right-hand margin), a perfectly level output is seldom desirable in practice. A slight "boost" of the bass tones with attentuation of the high frequencies beyond the 5,000—8,000 cycle range gives more pleasing, if actually less natural, sound. Then too, the acoustics of each auditorium re-

10 db at 8,000 cycles, 12 db at 10,000 cycles, and 20 db at 15,000 cycles. Such tracks, however, are usually played with wider scanning slits (1 and 1¼ mils), producing even greater high-frequency attenuation in reproduction, so far as photocell output is concerned.

The CinemaScope magnetic track (curve B) is extremely irregular when uncompensated by the recording amplifier. It is relatively only half "normal signal strength" at 60 cycles, and again slightly above 20,000 cycles; but it is nearly twice normal strength in

sired to print the track in all three emulsion layers of dye-coupler film, the high-frequencies are given an extra boost to make up for the slight loss of scanning-beam focus. Note, however, that track noises and various types of sound distortion are increased by boosting a weak signal too much.

In Fig. 4 we can examine the level response obtainable from optical tracks, as recorded with modern high-fidelity, wide-range apparatus. From the practical point of view, optical sound may be considered level (if we want it that way) from 30 to 10,000

FIGURE 4

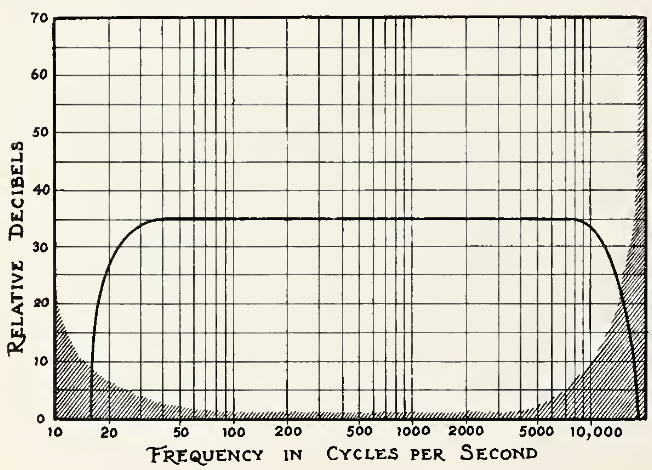
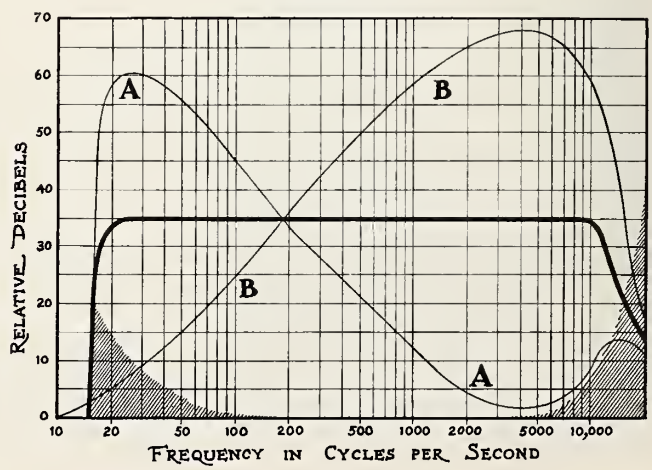



FIGURE 5



cycles. As a matter of fact, advanced theatre optical-sound systems are fully capable of giving such response; but the average "good" system provides uniform response only from about 100 to 8,000 cycles.

The shaded regions indicate the relative intensity of combined track noise, and photographic and other distortions. (Distortion is even greater than shown in the case of old-style variable-density recordings made from optical originals and duplicates. The high quality and greater signal strength of modern optical tracks in the high-frequency region are due to the use of wide magnetic original and re-recorded tracks.

### *Noise and Distortion*

The noise-plus-distortion in the low-frequency range is due largely to over-amplification; in the high-frequency range, to the same factor as well as to imperfect action of the "noiseless" biasing. The constant level of noise-plus-distortion all along the main frequency band in optical sound is the natural result of biasing deficiencies, emulsion graininess, etc. To this noise level must be added the hiss of the illuminated photocell, of course.

In Fig. 5 the heavy line represents the level response which CinemaScope magnetic sound is capable of when the tracks are new and the soundhead reproducer unworn. CinemaScope magnetic sound is thus under the most favorable conditions only slightly superior to the standard optical-sound curve shown in Fig. 4. Noise with *new* magnetic tracks is less than with optical tracks along the main range, but greater at the low-frequency end, and about the same at the *usable* high-frequency end.

Distortion in the low- and high-frequency regions of the CinemaScope magnetic-track curve is due to the natural track noise and inherent harmonic distortion magnified by over-compensating the weak parts of the signal (curve B) by non-linear amplification during recording (curve A).

While CinemaScope magnetic sound gives an appreciably strong signal even above 15.000 cycles, optical sound fails utterly at this point. We can expect nothing usable in optical sound over 12.000 cycles; and the practicable limit seems to be 10,000 cycles. We must not consider making the scanning beam much narrower because, if that be done, the ground-noise level is raised.

This does not mean that CinemaScope sound is superior to optical. Magnetic tracks on release prints have fatal weaknesses, as does the reproduction process. In practice, deterioration of tracks and apparatus produces serious attenuation above 5,000—6,000 cycles; and this is nearly always accompanied by distortion more severe than the worst ever encountered in optical sound.

### *Excellent Performance*

Optical sound performs excellently above 5,000—6,000 cycles no matter how old the tracks may be. Only scratches on the film hurt the sound by introducing noise. Modern optical tracks have the advantage of high-grade magnetic *recording* which makes possible level track characteristics up to 10,000 cycles. Older standards for optical tracks (such as previous recommendations of the Academy of Motion Picture Arts and Sciences) are no longer applicable.

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### New Orleans Theatres Cited

In a recent article, the newspaper, *New Orleans States,* saluted the neighborhood theatres in that area for bringing "entertainment within walking distance of most of their customers." According to the newspaper, the local theatres have renovated and installed the finest equipment available to bring the best possible entertainment. Added feature is parking space adjacent to the theatres.

## MOTOR GENERATORS

(*Continued from page 24*)

a drooping voltage output with an increase in load? This difficulty has been viewed by the writer in numerous instances, and a little attention to the theory of commutation indicates why it happens.

First, let it be remembered that the purpose of the commutating field is to vary with the load current and thereby erase distortion of the field patterns of the shunt windings caused by increased armature flux resulting from increased load currents. This provides for sparkless commutation at all loads. Old timers perhaps recall that pre-interpole machines require constant commutator resurfacing and careful setting of brushes for spark-free operation under the service conditions.

### Factory Markings

The proper place for brush settings is marked at the factory by a chisel or center-punch or paint dot. This mark is traditionally set on the brush rotating yoke in such a place as furnishes ready orientation with its mate on the generator end-bell. Projectionists wishing to attempt improvement of the voltage curve of any generator should locate this mark, or failing to locate it, place temporary marks which will permit a return to original setting if necessary.

After the generator and grid resistors have been brought to the approximate temperature of mid-day operation, the terminal voltage of the generator should be measured with each lamp singly, and with any two lamps burning simultaneously. If the generator voltage drops at all with the application of the second arc, and *if the output rating is not exceeded*, it is possible that slight brush shifting can obtain a more uniform output.

Use good judgment here in selecting the final point for brush setting. If constant output can be obtained without sparking at the brushes, by all means operate the generator in this manner, and the screen efficiency will improve from the elimination of that annoying dip when the second arc is struck.

A few words are in order as to the best loading for a motor generator set. The writer has heard otherwise informed projectionists boast of the fact that the generator was "just loafing" with the arc load. In some fashion, this misconception has become deeply rooted, and it is time it be pinned for the fallacy it actually is.

### Peak Efficiency

The reader may write as an inviolable rule the statement that every generator operates at its best efficiency when operated at 100% of its rated output. A measurement of the watts input against watts output of a generator does not tell all the story, for induction motors which drive generator sets operate at rapidly dropping power factors as their load is decreased.

In typical figures, this means that depending upon the size of the drive motor, a generator may run at an input power factor of 0.8 to 0.87, whereas at small loads the same motor may drop to 0.2 to 0.3 power factor. (Students of AC theory will recall that power factor is equal to the cosine of the angle included between voltage and current waves, or to watts measured by a wattmeter divided by apparent watts obtained by voltage and current readings.)

Discussion of the effects of reactive power is perhaps beyond the proper scope of this article, but it is appropriate to observe that this component of current at quadrature (90°) with the voltage results in lowered power-line efficiencies. Many utility companies insert a penalty clause in power contracts providing for a rate increase if the total load factor falls below some point agreed upon. If arc generators are operated somewhat below 100% load rating, the theatre may be paying extravagant amounts for *all* power used. The obvious solution is to operate equipment at what is its measurable best efficiency, or to replace it with adequate units which will bring increased day-long efficiency to the arc power system.

---

### Less Color for Drive-Ins?

The recent Hollywood tendency to make more black-and-white films is putting drive-ins at a disadvantage, according to Reno Wilk, Triangle Outdoor Theatres' circuit general manager. Noting that of 269 films issued, only 116 were in color, Wilk pointed out that color is the drive-in's "bread and butter." Preferred by the patrons because they show on the outdoor screens better than black and white, color pictures invariably do better business for the drive-ins.

On the other hand, Alan E. Freedman, head of DeLuxe Laboratories, predicts a swing back to color this year. Noting that black-and-whites had "hurt" the 20th-Fox subsidiary, he reported that color orders for the first six months of 1957 are equal to those of a comparable period in 1955.

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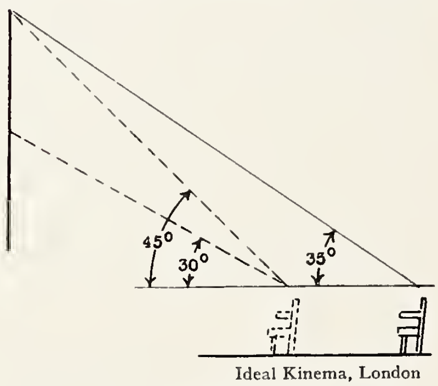
## Viewing Angles Studied

Horizontal and vertical viewing angles in modern British theatres were the subjects of a recent study conducted by a committee on eye-strain of the Illuminating Engineering Society of Britain.




**Maximum vertical viewing angles recommended by British group.**

The Society holds a unique position in Britain's theatre industry as its recommendations are very often incorporated into the laws of the land.

Prior to the advent of wide screens, definite restrictions were established in regard to the horizontal viewing angles from seats in motion picture theatres. The widespread use of wide screens, however, necessitated a reappraisal of the situation, and following the recent investigation by the IEE, it was suggested that the former requirements be relaxed until the wide-screen idea is more thoroughly understood.

The Society found the vertical viewing angle to be another matter, for the report reaffirmed former limitations. As the accompanying diagram indicates, it is recommended that the spectators in the front rows should not have to look upwards more than 35 degrees to the top of the screen.

Recommendation is also made for theatres in which this is not structurally or economically feasible. When exceptions are made, the vertical viewing angle can go as high as 45 degrees to the top of the screen provided the angle to the mid-point of the picture does not exceed 30 degrees.

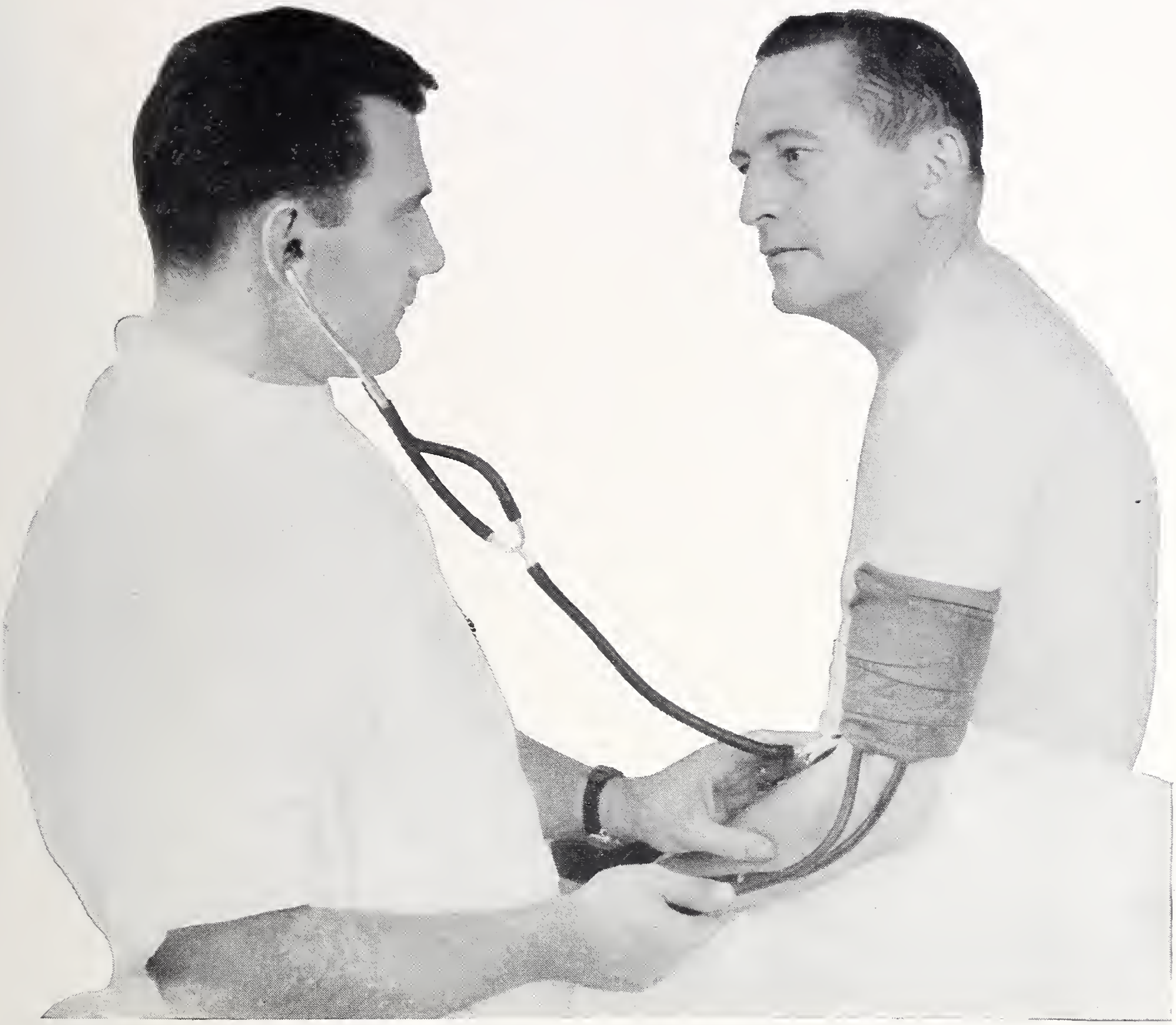
## GENEVA MOVEMENTS

(*Continued from page* 14)

celerated action in the pulldown cycle accomplished by means of slipper block and offset driving shafts. This I consider the ideal solution in future designs, and actual trends in projector design show preference for this solution.

A concluding installment of this article will discuss other fast intermittent movements with particular reference to some, such as the famous Powers movement, which is not of the geneva type.

[TO BE CONCLUDED]



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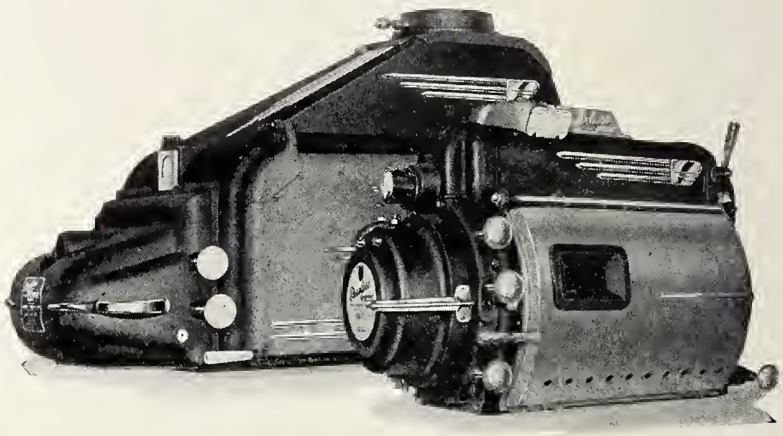

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# International PROJECTIONIST

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# *Monthly Chat*

## Good News Tonight

BACK IN the days of radio, there was a commentator who used to come on with: "There's *good* news tonight!" Usually there wasn't, but somehow that phrase perked up the day a little. IP has never looked at the industry with rose-or-any-other-tinted-glasses, but there's no denying movie biz has taken a fairly sharp upswing the last couple of months.

Item One: 20th-Fox, in their own survey, came up with a report of 22.8% increase in patronage. Considering the overall picture of late, that may be on the conservative side. More about 20th-Fox below.

Item Two: National Allied held its biggest drive-in convention ever last month, a solid indication of the growth that section of the industry has taken.

Item Three: Good pictures—repeat, loud and clear—*good* pictures are packing 'em in. In some cases, flics like "Anastasia," "Giant," "Friendly Persuasion," and "Teahouse of the August Moon," have over-stayed their scheduled runs by as much as three-four weeks. Exhibitors have been asking for increased production. Fine. But let us keep in mind that even if you released 100 turkeys a year, they remain turkeys, and our enlightened patrons are going to stay home with the quiz shows.

Item Four: Theatre seating has more than doubled in the past ten years. Drive-in expansion (and they're building about 250 a year) has helped, so that now about 27,000,000 people can be accommodated. And there are no signs of the pace slackening.

And it's only space limitations that prevent us from mentioning a half-dozen more such items. The first week in January the Stanley Warner chain grossed more than it ever did in its history, and . . . well, as we said: space limitations.

## Minor Item

PEOPLE can be wrong. A captain once told the young Napoleon that Nap didn't know anything about handling artillery. When TV was in its pioneer days and just being demonstrated around on postage-stamp screens, the trade papers were complacently assuring the motion picture industry it had nothing to worry about. But every now and then we run across an item that may be a harbinger of something. Just may.

So for what it's worth: the Garrick Theatre was a Balaban & Katz house in Boston. In 1950 it was shuttered, and in 1952 converted to a TV studio. This April the Garrick is going back to being a movie theatre.

## Small Theatre Help

CONGRATULATIONS to general sales manager Alex Harrison and everyone else over at 20th-Fox for their policy to reopen closed theatres and revive business in the small and subsequent-run houses. Although percentage-wise the small theatres do not make up an overwhelming part of Fox's business, they nevertheless are an important and necessary part of the arrangement, and any boost they can get is well deserved. We wish this campaign the best of success.

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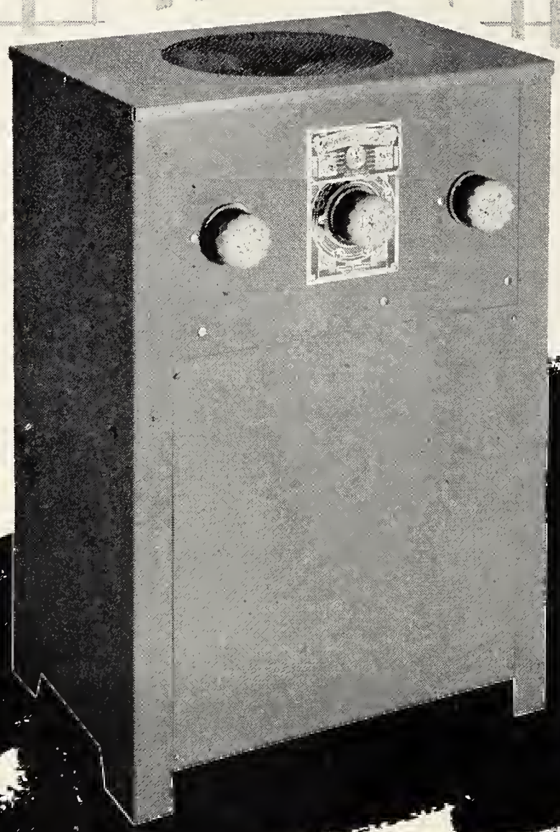

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INTERNATIONAL PROJECTIONIST

Volume 32 FEBRUARY 1957 Number 2

# That Important Optical Train

By ROBERT A. MITCHELL

**Part one of a two-part article: an evaluation of one of the essentials of the projectionist craft, starting from the elementary optical systems to the complex requirements of today.**

EVEN IN ITS most elementary form, the projection process involves a number of optical components which must be "in line." These are the photographs to be projected and the objective lens which projects the photograph upon a screen. "Object" and "lens" thereby form the fundamental *optical train* of the projection apparatus; and an imaginary line constructed to intersect their exact centers constitutes the *optical axis* of the projection instrument.

The above remarks apply to cameras as well as to projectors. In fact, a camera may be considered to be a projector "in reverse." Instead of throwing light out—*projecting* it.—a camera admits light and focuses it upon a sensitized emulsion. And this brings us to a consideration of the component which cameras never have, but which is a necessity for projectors, viz. a source of optically controlled, very bright light. All projectors must be equipped with specially designed lamps to furnish illumination for the picture.

The various elements of the projector lamp are not necessarily in line with the "object" (photograph) and the lens, even though all these components are always located on the selfsame optical axis in theatre motion picture projectors.

The "reflectoscope" projector made for showing opaque postcards, drawings, charts, etc. needs little more than bare incandescent bulbs, usually one on each side, to illuminate by reflected light the opaque object to be projected. And many 16-mm and other portable movie projectors utilize a diagonal mirror behind the aperture to permit placement of the lamphouse on the gear side of the mechanism for greater compactness. This is a very good arrangement.

### "Straight-line" Set-Up

In the present article, however, we shall consider only the "straight-line" arrangement of the lamp components used in professional lantern slide and cinema film projectors—the types of picture projecting apparatus used daily by theatre projectionists all over the world. The optical trains of such projectors accordingly include the optically functioning parts of the lamp on the "object-and-lens" axis of the picture mechanism. And because the "object" is a *transparency*—a photograph on an emulsion-support of glass or film—the lamphouse is located *behind* the picture aperture in which the transparency is "framed."

It is not enough to place a bare light source—bulb or carbon arc—behind the picture aperture. Even though the aperture, itself, may be uniformly illuminated by this expedient, the source will necessarily be imaged on the screen as an out-of-focus "object." and a fuzzy spot of light will be obtained on the screen instead of a clear, uniformly bright rectangular "field" bounded by the edges of the slide or film aperture. This state of affairs is represented diagrammatically by Fig. 1, as shown below.

The bare-light method does not give a completely illuminated field unless

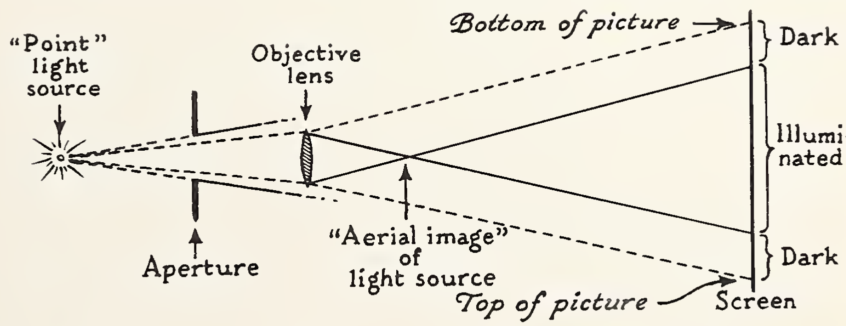


FIG. 1. Why a bare light source cannot be used for projection. Without a diffuser or condenser system, the cone of light intercepted by the objective lens may not include all of the area of the film or slide aperture, hence only a spot at the center of the projected picture is illuminated. But whatever method of illumination is used, note that the projection lens inverts the image of the object, requiring the picture to be placed in the aperture upside down.

the lens be larger than the picture aperture, in the case of a "point source" of light. Even then, the method is so inefficient that the projected picture is exceedingly dim.

### *Efficiency Evaluation*

The efficiency of any projector illumination system depends on (1) *how much* of the light emitted by the source is collected and converged upon the aperture, and (2) *how much* of the light passing through the aperture is intercepted and focused upon the screen by the projection objective lens. The bare-source method permits utilization of only a very small fraction of the total light. Modern motion picture systems, with lamphouse light-collecting angles ranging from 90° to 150°, and with high speed lenses capable of intercepting from 75% to 100% of the light passing through the aperture, are thousands of times more efficient lightwise.

Suppose, now, a "light-diffusing" screen of ground glass is placed behind the aperture of our bare-source projector, as in Fig. 2. The frosted glass effectively scatters the light over the entire area of the picture aperture, illuminating the projected picture more or less uniformly from corner to corner. No improvement in the *brightness* of the picture will be noted; but the diffuser allows the light source to be brought closer to the aperture for greater brightness of the image on the screen.

While hardly efficient enough to be used for projection in theatres, the light-diffusing system nevertheless is widely used in low priced photograph enlargers. In fact, the diffusing method constitutes the very simplest practicable illumination system for projection purposes. Of its two elements (light source and ground-glass plate), only the source need be considered in the optical lineup procedure, it being sufficient merely to have the ground glass cover the aperture area. And the positioning of the source on the optical axis is not at all critical in this system.

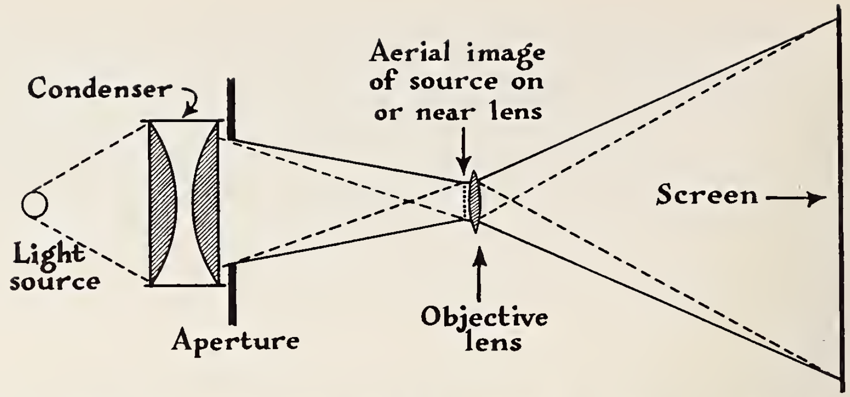


FIG. 3. "Stereopticon" condensing-lens system of illumination. The aperture is placed close to the condensers, and the light source is imaged upon the objective lens. There is thus no loss of light between the aperture and the lens. The "aerial image" of the condensers and the image of the slide coincide on the screen.

The diffusing system of projection illumination may be demonstrated by placing a clip of safety motion picture film close to a frosted incandescent bulb and focusing the picture on a nearby wall by means of a magnifying glass. Here you have the principal elements of a rudimentary optical system: Source—Object—Lens.

Let's go a bit farther and add the elements necessary for a really efficient picture-illuminating system, namely, the so-called "stereopticon" system as used in most lantern slide ("dia") projectors. These are employed in a large number of theatres, often combined with spotlight and effect-lighting apparatus, for showing standard 3" x 4" glass announcement and advertising slides.

A large-diameter condensing lens, usually consisting of two plano-convex lenses mounted together to minimize spherical aberration, is required to *collect* as much light from the source as possible and *converge* it, through the slide aperture, upon the objective lens which projects the picture upon the screen.

The distinctive features of the stereopticon system are (1) placement of the slide aperture very close to the surface of the condenser and (2) formation of an image of the light source (arc crater or bulb filament) upon the objective lens. These features, shown in Fig. 3, result in smooth illumination of the projected aperture field and efficient channeling of the light through the projection objective. It is to be noted that the objective lens may be rather small, forasmuch as the image of the source thrown upon it is very concentrated and smaller than the slide aperture.

### *Stereopticon Disadvantages*

The only disadvantage of the stereopticon system is that cracks and fingermarks on the condensing lenses are visible as smudges on the screen. The reason for this is the closeness of the aperture to the condensers—when one is in focus, the other is very nearly in focus.

Because the aperture, or mat opening, for standard slides is 2¼" x 3" for a standard aspect ratio of 1/1.33, 1 5/64" x 3" for an aspect ratio of 1/1.66, 1⅝" x 3" for an aspect ratio of 1/1.85, and 1½" x 3" for an aspect ratio of 2/1, the diagonal of these openings ranging from about 3½ inches to 4 inches, the diameter of the condensing lenses need not exceed 5 inches.

In recent years smaller slides having outside dimensions of 2" x 2" have been standardized for home, educational, and TV use. A few theatres have installed projectors for showing these. Most home apparatus for projecting two-by-two's also utilizes the stereopticon illumination system, but for theatre use the small diameter condensers (scarcely 2 inches in diameter) do not pick up a sufficiently large angle of light from powerful sources

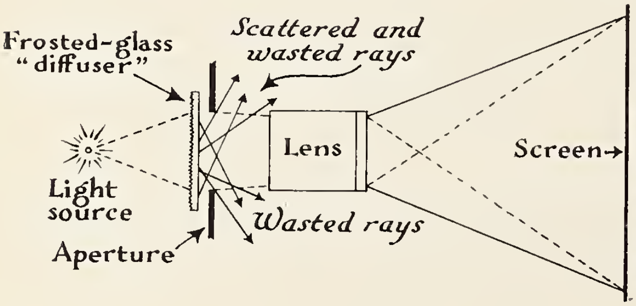


FIG. 2. The simple "diffusing" system of illumination which employs a ground-glass diffuser of the light emitted by the source. The diffuser must be at least as large as the film or slide aperture. This system, used in certain photographic enlargers, is too inefficient lightwise for projection in theatres.

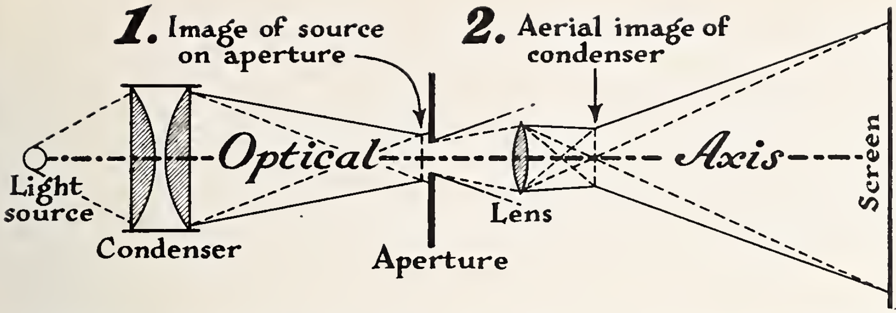


FIG. 4. "Motion-picture" condensing-lens system used for projection when the slides or film-photographs are relatively small in size. In this system the source is imaged by the condensers upon the film aperture, hence the need for a small, uniformly bright light source. As a rule, the stereopticon system gives a more uniformly illuminated "field."

to give a bright picture. Accordingly, a different type of optical system, one which is essentially the same as that used for motion-picture projection, is employed.

The "motion picture" illumination system is required when the "object" —film or slide—has a relatively small area. Instead of the aperture being placed close to the condenser, and the light source being imaged upon the projection lens, the source is imaged by condensers of large, very efficient diameter upon the "object," itself. In other words, the light is concentrated by the condenser upon the relatively small aperture.

### Preferred Illuminants

This kind of optical system demands a light source of uniform brightness and small size for even, efficient illumination of the field. Incandescent ("mazda") bulbs give a somewhat streaked field with this system because a more or less in-focus image of the tungsten filament is produced upon the aperture where the film or slide is located, and this is relayed to the screen by the projection objective. The carbon arc is the preferred illuminant for motion-picture optical systems, the low-intensity arc having ideal light distribution characteristics, though inferior to the high-intensity arc in brightness.

Fig. 4 illustrates the motion-picture optical system employing condensing lenses. One of the most powerful projection lamps available, the Peerless Hy-Candescent HI arc lamp, utilizes condensing lenses of high optical "speed" (*f*: 2.0) and fully corrected for spherical aberration. As stated before, the motion-picture system may be used for small sized lantern slides as well as for motion picture films.

The motion-picture system of optics requires the use of larger ("faster") projection lenses than does the stereopticon system. Instead of continuing to converge after passing through the picture aperture, the light rays begin to *diverge*, spreading out after having formed an image of the source on the aperture.

The angle of divergence depends on the size of the aperture and, particularly, on the diameter and distance from the aperture of the lamphouse condensing lens (or mirror in the case of mirror lamps). In fact, no simple relationship exists between the "speed" of the lamp optics and that of the projection lens. The idea that an *f*:2 lamp condenser or mirror is "matched" by an *f*:2 projection objective is one of the favorite fictions of motion picture technology. It has no basis whatever in fact.

It can be demonstrated by geometry that lamp condensers and projection lenses of the same speed rating are optically matched *only when the picture aperture is a mere pinpoint*. When the aperture is an area of appreciable size, such factors as the diameter and distance of the lamp condenser and the focal length of the projection objective enter into the matter. In general, projection lenses substantially *faster* than those in present-day use must be employed to establish a condition of true optical match.

Fortunately, it is not necessary to use lenses which are perfectly matched to the lamp optics: modern fast lenses are so efficient that little would be gained by making them any larger. Besides, there are more satisfactory methods of obviating the loss of light occasioned by slight optical mismatch, as we shall see in the next installment of this article.

### Mirror Systems

Fig. 5 shows two motion-picture optical systems utilizing mirrors, which take the place of the condensing lenses of Fig. 4. The system employing a mirror *alone* is the usual one for present-day reflector arcs: the one employing a large converging lens *in addition to a mirror* was first used more than 25 years ago in Motiograph low-intensity reflector arcs and in a few lamps of European manufacture.

When a mirror is used without a converging lens, the curvature of the mirror is *elliptical*. This kind of curvature has two focuses (Latin plural, *foci*), the light source (crater of the positive carbon) occupying one focus and an image of the source being formed at the other focus. Since the image of the luminous crater is formed

(*Continued on page* 41)

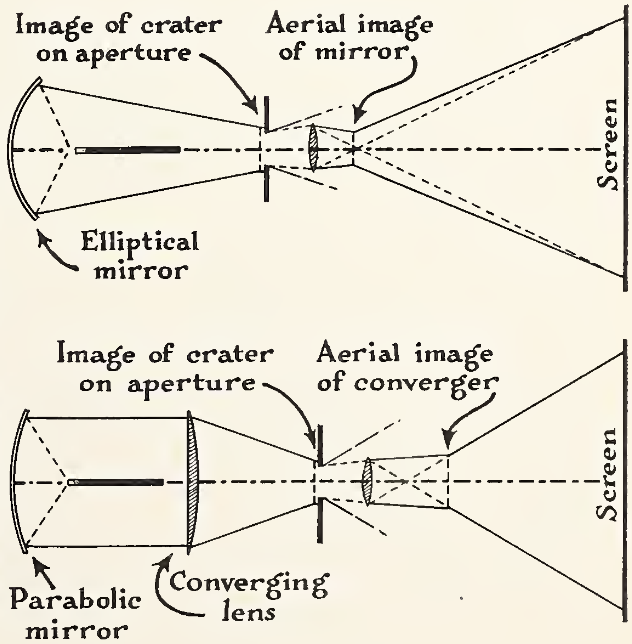


FIG. 5. Reflector systems for motion picture projection. Each of these, like the motion picture condensing-lens system, images the light source upon the film aperture. The system without the converging lens is the more commonly used, the elliptical mirror functioning as a converger as well as a collector of the light. The parabolic mirror-and-lens system avoids loss of light occasioned by the positive carbon holder at a point where the beam is more or less concentrated.

**In keeping with IP's policy as an open impartial forum, herein are one manufacturer's views on the ever-controversial light output problem with present-day equipment.**

# SCREEN ILLUMINATION: Some Pertinent Facts

By ARTHUR J. HATCH
President, Strong Electric Corporation

A RECENT article in IP indicated that it was possible to realize up to 50,000 lumens through a "standard" 35-mm aperture burning regular 13.6-mm carbons with $f$:1.7 or $f$:1.8 projection lenses. Other articles in the trade press have indicated similar high lumen values for projection with regular carbons without mentioning the size aperture these values were obtained through. It is cntirely possible to obtain illumination approaching these valucs through certain film apertures when using thesc regular carbons with reflector type lamps, but considerable confusion has been caused in the minds of projcctionists and exhibitors by the assumption that illumination of this order can be presently obtained through all aperture sizes. It is in an effort to keep the lumen "honest" in the eyes of projectionists and exhibitors that we direct this article.

### Test Results

Table I sets forth the various total lumen figures without shutter or heat filter that can be projected through various apertures with newest reflector lamps presently available, using regular 13.6-mm carbons and with projection lenses that are suitable for use with the particular projection system.

These tests point up that under no circumstances are figures of 49,000—50,000 lumens even approached with standard (.825 X .600) apertures, only with CinemaScope or a proposed 55-mm projection system utilizing a more nearly large square aperture is a figure of over 40,000 lumens realized. If such a figure of illumination could be reached with a conventional carbon arc burning regular carbons, Strong Electric would certainly not be expending time and money in the development of new arc burning techniques that promise in the future to reach this elusive figure of 50,000 lumens through a standard (.825″ x .600″) aperture.

### An Amperage Fallacy

A fallacy that continues to receive support, both in popular fancy and occasionally in print, is one which suggests that the amount of light which can be projected with any given system is solely a function of arc amperage and, consequently, a large increase in light can be obtained simply by use of larger carbons and/or a higher current.

The record should be cleared on this matter as often increase of current will only slightly increase the total light with greatly increased cost of operation.

Generally speaking, use of a larger carbon size will increase slightly the light at the edge of the screen, the light at the center of the screen will remain about the same, and the cost of operation will increase. Beyond a certain point increase of carbon size is uneconomical, as the spot produced at the plane of the aperture is so large that a high percentage of the total light never goes through the aperture.

Change to such sizes as 13.6-mm or larger in reflector type lamps for 35-mm projection should not be made unless some means to reduce the magnification of the spot on the aperture are undertaken at the same time. Also it usually is necessary to use higher speed projection lenses. Recommendations as to magnification reduction means of lamphouse manufacturers should be followed in these instances. Table II presents values of illumination that are obtained with various size carbons and arc currents. All light and heat values are taken without shutter running and without heat filter.

### Similar Optics

As will be noted, Systems 1, 2, 3, and 4 are all with the same optical elements both as to lamphouse and objective lens. Note that the illumination in the center of the screen is approximately the same for the first four systems even though the arc currents range from 90 to 150 amperes. However, although the edge of the screen is better illuminated by the larger carbons, the total screen lumens are only increased approximately 5% for each jump in carbon size or a total of 14% from 9-mm to 13.6-mm carbon size, while the cost of operation goes from $2040 per year for 9-mm to $2800 per year for 13.6-mm positive

**TABLE I**

| Aperture | Total Lumens 13.6-mm carbon at 160 ampere | Remarks |
|---|---|---|
| 35-mm standard (.825 X .600) | 35,000 | $f$:1.5 lens and lamphouse optics $f$:1.5 |
| 35-mm CinemaScope (.912 X .715) | 44,000 | $f$:1.5 lens and lamphouse optics $f$:1.5 |
| 70-mm wide film (1.968 X .788) | 25,000 | Projection lens designed for wide film |
| 55-mm wide film (1.360 X 1.065) | 42,000 | Projection lens designed for wide film |

carbons. These carbon costs are based on 4000 hours operation per year.

Measurements in Systems Nos. 5 and 6 were made under conditions where the size of spot was reduced by decreasing the magnification of the lamphouse optical system. This results in a higher speed lamphouse optical system which in turn requires a higher speed projection lens. Indeed, as the results on System No. 5 show there is no gain over System No. 4 when using the relatively slow $f$:1.7/1.8 lens. However, with the use of a $f$:1.5/1.6 lens as in System No. 6 the screen lumens are increased to 30,000 or a gain of 2000 over System No. 4.

### Spot-Shaping Lenses

System No. 7, Table II, shows results obtained by burning 13.6-mm carbons to 165 amperes and at the same time still further reducing the spot size by a decrease of magnification and increase of lamphouse optical speed to $f$:1.5, and projecting with a $f$:1.5/1.6 projection lens. The resulting screen light as shown by the table is 36,200 lumens which should represent the highest amount that will be realized in the near future through standard (.825 x .600) 35-mm projection systems using conventional arc burning methods and regular carbons.

A reflector center-to-aperture distance of 31 inches would be necesary to obtain this speed and magnification with an 18-inch diameter reflector alone. However, with the new auxiliary spot shaping lenses now available in the new Strong "U.H.I." and National Theatre Supply Co. "Constellation 170" lamps, an efficiency factor equal to $f$:1.5 is obtained without the necessity for this close and usually impractical close coupling of lamp and projector.

Robert Mitchell's article in the November 1956 issue of IP presents a table wherein a total of 50,000 screen lumens is shown to have been obtained by use of 13.6-mm regular carbon through a 35-mm standard aperture using a $f$:1.7/1.8 lens. In the light of these tests and tests run by others independently it appears that the lumen figures in this article should be revised to show 36,000 lumens and then only with $f$:1.5 projection lenses. Exhibitors should check carefully before erecting screens to take advantage of light of this 50,000 lumen value through 35-mm standard apertures with presently available equipment.

Mr. Mitchell's article implies that the energy at the center of the film is greater with a 9-mm carbon at its highest current than with larger carbons. This is not borne out by the actual tests shown in Table II, and a comparison shows very little difference in watts/sq. mm total energy at the center of the aperture for systems 1 to 4 for various size carbons. The tendency to blister film will be proportionate to this energy factor. The total energy at the center of the aperture will, however, be proportional to the visible or useful amount of light at the center of the screen as shown by the energy figures in Table II for Systems 5 through 7.

It is agreed that there is enough energy at the aperture with 18-inch reflectors using any carbon trim from 9-mm to 13.6-mm to require the use of heat filters or "cold" mirrors at least with black-and-white film, but the same filter or "cold" mirror will protect the film when used with any carbon, size 9 through 13.6-mm.

### Correct Positioning

Good practice calls for positioning of the lamphouse reflector in such a relationship to the aperture that the resulting spot of light at the aperture is sufficiently large to give a maximum of total illumination consistent with a reasonable uniformity but with absence of color differences across the screen. If the lamphouse reflector is positioned nearer the aperture than at this optimum point, poor uniformity with color differences across the screen are apparent. If the reflector is positioned further away than this optimum point, the color uniformity is not improved—the measured intensity uniformity is bettered, but there is realized a lower intensity of light at all points of the screen. Lamp manufacturers' recommendations in this respect can serve as a general guide, to be tempered by local conditions, such as arc amperage, type of screen, projection lens, etc.

The writer has personally experienced dozens of cases and has read field engineer reports of several hundred cases where poor screen light uniformity, both in color and intensity, were corrected without any change of lamp-to-aperture distance, change of carbon size, or arc amperage. The

TABLE II

| System No. | Positive Carbon Size | Arc Current | Lamphouse Optical Speed and Magnification | Projection Lens Optical Speed | Watts per sq. mm. center of aperture | Ft. Candles Incident on Screen (40'x30') Center | Side | Total Screen Lumens | Side to Center Uniformity | Pos. Carbon Cost per Year |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 9-mm | 90 | $f$:1.7 5.45 | $f$:1.7/1.8 | .93 | 29.6 | 15.4 | 24,500 | 52% | $2040 |
| 2 | 10-mm | 105 | $f$:1.7 5.45 | $f$:1.7/1.8 | .93 | 29.6 | 16.0 | 25,000 | 54% | $2080 |
| 3 | 11-mm | 120 | $f$:1.7 5.45 | $f$:1.7/1.8 | .96 | 30.0 | 17.4 | 26,400 | 58% | $2360 |
| 4 | 13.6-mm | 150 | $f$:1.7 5.45 | $f$:1.7/1.8 | .95 | 29.8 | 19.4 | 28,000 | 65% | $2800 |
| 5 | 13.6-mm | 150 | $f$:1.6 5.1 | $f$:1.7/1.8 | .96 | 29.8 | 19.4 | 28,000 | 65% | $2800 |
| 6 | 13.6-mm | 150 | $f$:1.6 5.1 | $f$:1.5/1.6 | .98 | 30.6 | 21.4 | 30,000 | 70% | $2800 |
| 7 | 13.6-mm | 165 | $f$:1.5 4.75 | $f$:1.5/1.6 | 1.05 | 40.0 | 24 | 36,200 | 60% | $4160 |

only thing that was necessary was the simple operation of clearing away obstructions between lamphouse and aperture.

Heat baffles, safety dousers and structural parts were filed away until a clear path from edge of reflector to corresponding edge or corner of aperture was obtained. This path can be defined easily by stretching a string between edge of reflector and corresponding point on aperture. The string should have a slight clearance with all projector parts to insure that discoloration on the screen from this cause is not present.

The aperture, contrary to authoritative statements, is never illuminated solely by "core" light from the carbon core in an efficient light gathering system. The matter of correct magnification is not a simple thing as implied, because the magnification of a given reflector is not constant for all zones. The maximum magnification is at the center of the reflector and the minimum magnification is given to those rays reflected from the edge of the reflector. Table III shows how the magnification varies over the reflector's various zone angles for a popular type of 18-inch reflector.

If the constants of a lamphouse optical system were set up so that the "core" light as magnified by the edge of the reflector filled the aperture, there would be an enormous waste of light from sections of the reflector nearer the center. Consequently as in most similar situations a compromise is made for optimum results.

### *40 Ampere Test*

As a means of illustrating how the speed (or pickup angle) of a reflector can vary the uniformity of light on the screen, tests were run on a Strong 1 Kilowatt lamp burning at 40 amperes and projecting through an $f$:2.0 coated lens. Tests were made using the regular 11⅜-inch diameter reflector with a speed rating of $f$:2.35 and also through a 6⅝-inch diameter reflector of the same focal length and working distance with a speed rating of $f$:4.2. The projection lens center axis was moved sideways across the aperture as corresponding readings across the screen were taken in order to eliminate all lens vignetting effects in a manner described later in this article. Incidentally, vignetting on the edge of the screen without moving the lens would have been zero with the 6⅝-inch reflector and only 4% loss with the 11⅜-inch reflector. Table IV gives the results of these tests.

**TABLE III**

| Zone Angle Off Axis from Focal Point. | | Magnification |
|---|---|---|
| (center) | 0° | 5.45 |
| | 40° | 5.28 |
| | 80° | 4.80 |
| | 120° | 4.08 |
| (edge) | 152° | 3.37 |

**TABLE IV**

| Reflector Diameter | Foot Candles on Screen Center | Foot Candles on Screen Edge | Lumens | % Edge to Center Uniformity |
|---|---|---|---|---|
| 11⅜″ | 24.6 | 13.5 | 6750 | 55 |
| 6⅝″ | 7.3 | 5.6 | 2450 | 77 |

These results showing a 77% screen uniformity with a 6⅝-inch diameter reflector as compared to 55% with an 11⅜-inch reflector both having an axis magnification of 7.5 illustrates the fact that the outside zones of a reflector have a smaller magnification and consequently add more light to the center of the screen than to the edge. This effect is further accentuated by the fact that the outside zones of the reflector "see" a foreshortened or compressed source due to the off axis angle of view.

In Mr. Mitchell's article, the case is cited of the 10-mm positive being burned at 90-105 amperes in a lamp having a 16- or 18-inch diameter reflector and working with a 34-inch reflector center-to-aperture distance. Although this distance of 34 inches is rather close, giving only an axis magnification of about 5.2 (our instruction book for the combination suggests a working distance of 36½ inches or a magnification of about 5.6), a comparative measurement was made between this setting and the recommended remedy—that of pulling the lamphouse back so that the reflector center to aperture distance was 40 inches. The results of this comparison are shown in Table V.

These measurements were made with standard $f$:1.7/1.8 coated projection lens using a 10-mm positive at 100 amperes, and projecting through a standard 35-mm aperture with the front of the lamphouse opened up with a hole large enough to permit the full beam size to pass to the 40-inch working distance. There is a complete lack of evidence that any areas of the screen will be brighter at 40 inches than at the 34-inch distance. Total illumination is down to 73% of the value obtained at 34 inches.

Anyone who goes to the trouble of making this experiment will soon return to the 34 (or 36½-inch) working distance, as the loss in total lumens will produce a much poorer quality picture than is gained by the slight increase in uniformity.

### *Optical Speed Assured*

The point has often been made that the optical speed of the objective lens must at least be equal to that of the reflector so that light collected by the reflector will not be subject to excessive loss through vignetting in the lens. The projectionist can rest assured that the lens designers know that their lenses are to be used for 35-mm projection and, accordingly, a lens of a given speed will generally pass most of the bundle of light rays passing through the 35-mm aperture at the lamphouse with an optical speed corresponding to the lens rating.

**TABLE V**

| Working Distance | Ft. Candles Center | Ft. Candles Side | Total Lumens | % Side /Center |
|---|---|---|---|---|
| 34 | 825 | 427 | 23.200 | 52% |
| 40 | 568 | 356 | 17,800 | 62½% |

Certain practical considerations are of course always necessary, such as the law of "diminishing returns," and therefore even in the focal length range where zero vignetting might be ex-

(*Continued on page* 30)

**A small thing—yet, undetected, the cause of plenty of projection trouble and light waste.**

# An Old Lamphouse Headache: Those Cracked Carbons

By JOSEPH HOLT

Member, IA Local 428, Stockton, Calif.

THE SIMPLE THINGS are often the source of troubles which are the most difficult to solve. This statement holds true, we are told, in the fields of medicine, mechanics, and electronics: certainly it applies to the projection problem recently encountered by the writer.

The room being visited was of excellent design and equipage. The attractive and neat condition of the entire premises bespoke the pride of craftmanship taken by the projection crew.

The theatre was using a 70-ampere Suprex arc with good results, since the wide-screen image had been held to a total of 420 sq. ft. and the CinemaScope picture had been established with an area of 555 sq. ft. With the reflective type screen in use, normal light was quite pleasing.

### *Unpredicted Trouble*

But as the visitor watched, the screen assumed a blue cast and a defocussed picture was evident. Examination of the arc showed that the gasses normally present in front of the positive crater were dispersed; a double tail flame was noted, and arc amperage had risen to the 85-90 range.

The projectionist on duty gave vent to appropriate language, and moved the negative carbon back a trifle until normal amperage had been restored.

"That's the way it goes sometimes," he explained. "At times we will go an entire shift and never have one moment's trouble. and then night after day we have three or four carbons per shift which do just what you have seen. Now, what causes it?"

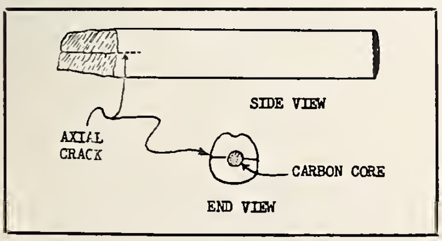


FIGURE 1.

The confession should be made that the writer was fairly certain of the cause of the trouble. having seen similar instances in 1941 and succeeding years when the Victory Suprex carbon was used. But in order not to get out on a limb, no opinion was voiced at once. for the reel had almost finished and the erratic arc operation continued until the end.

Questioning of the crew members gained the information that the trouble was not confined to any particular lamp; that it could occur at any point in the reel; that it usually persisted for from two to four minutes. After that length of time, normal operation would continue unless the negative carbon had tapered or "pencilled" during the high-current period.

After the offending lamp had been shut down, the carbon in use was examined. A magnifying glass told what was suspected: a pronounced split or crack was observed on each side of the positive crater. The "burnback" area was covered by the crack. and further peeling of the copper coating revealed that it continued for a quarter inch or so, as depicted in Fig. 1.

One can imagine the astonishment of the crew, who were experienced and conscientious projectionists. They had tried moving the field magnets of the lamps, replacing them, low draft, high draft, and no draft.

They were shown that the split can actually be detected on the arc position indicator card. This can usually be seen as an exceptionally bright line running along the length of the carbon somewhere about the circumference of the positive crater.

"Okay, so the carbon is cracked under the copper," spoke one of the crew, "how is it that case after case contains cracked carbons?" Diplomacy is in order at this point, for the length and frequency of experience for the cracks indicate that the fault lies with one or more members of the crew. Some one has been clamping the positive carbon with more force than wisdom. The cracking process has taken place even before the carbon is heated, so it is only necessary to wait until the carbon is burned to the point of that previous excessive clamping, and trouble occurs.

### *Why Carbons Crack*

We suspected the trouble might continue, so a revision of the positive carbon clamping lever was suggested. Figure 2 indicates the simple steps to be taken. The serrations which now interlock to provide adjustment of the clamping lever are carefully ground off

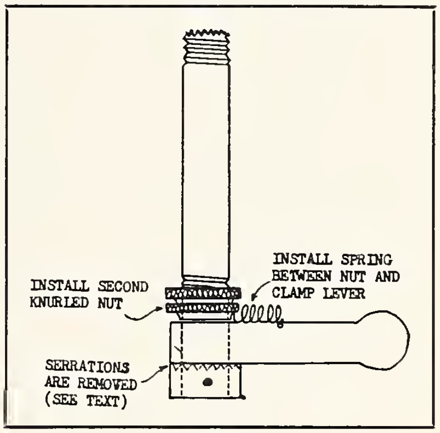


FIGURE 2.

in order that they constitute a "one-way stop." The clamping lever is now free to move in the direction which will close on the carbon, and is "spring-loaded" much in the manner of a torque wrench to provide only a safe and uniform tension on the carbon clamping screw. We have not heard as to the effectiveness of this modification. but it should provide relief from the too-loose-too-tight carbon problem.

Incidentally, we also left the reminder with our friends that the negative carbon can be cracked if the spring on the negative clamp is allowed to snap the clamp on the carbon. If it happens, the safest thing is to discard the carbon entirely. It is foolish economy indeed to risk performance interruption.

AT LAST!

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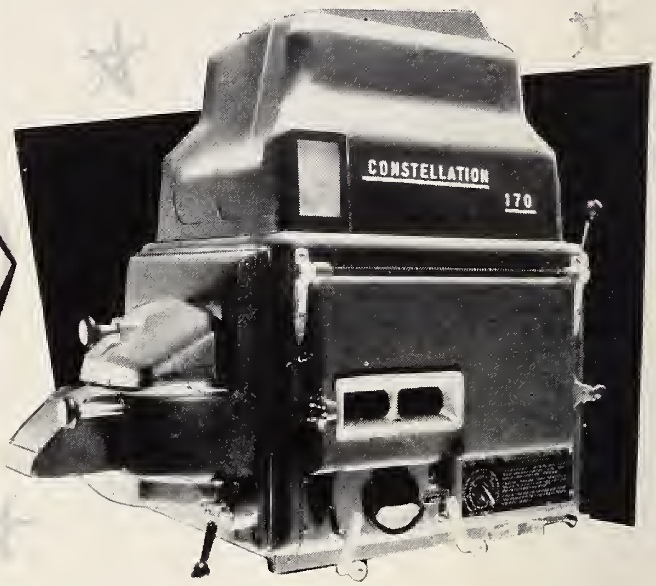


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The Light Booster lens provided with 13.6 mm trim lamps patterns the spot to the size and shape of the aperture so as to efficiently utilize all useful light from the carbon. All other lamps, projecting a round spot, waste much light, particularly above and below the aperture. Using a 13.6 mm carbon trim, the optical speed or mark of efficiency is equivalent to f 1.5 when f 1.5/1.6 projection lenses and X-L projectors are used.

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**PROJECTIONISTS**
like this because good projection becomes more automatic.

The automatic crater positioning system maintains the tip of the burning carbon at the exact focal point of the reflector. Change of light color at the screen, caused by variation in carbon burning rates, is absolutely eliminated.

**PROJECTIONISTS**
like this because it saves important time when needed.

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**PROJECTIONISTS**
like this because it makes the booth and equipment more tolerable.

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- Lens-Matching; Care of Lenses
- Screen Types and Picture Brightness
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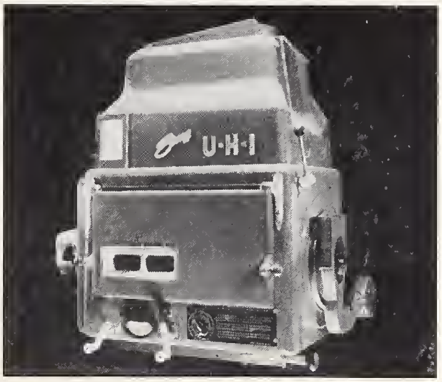
## Strong's New U-H-I Projection Arc

The Strong Electric Corporation introduced its new U-H-I projection arc at the recent Allied Drive-in Theatre Convention in Cincinnati. The company lists over 20 important features for the lamp, 14 said to be exclusive with the arc, among these an accommodation of a 20-inch carbon trim in all sizes. 9-mm through 13.6-mm inclusive. A single adjustment controls the feed of both carbons, allowing 9-mm through 11-mm sizes to be burned between 14 and 30 inches per hour, and 13.6-mm size from 7 to 20 inches per hour.

Instead of projecting a round spot, to prevent wasting light above and below the aperture, the new U-H-I patterns the spot to the particular size and shape of the aperture by means of a special "Beam Shaper" lens which is provided for the 13.6 trim lamps, thus utilizing all useful light, the designers state. The efficiency, using 13.6 carbon trim, is equivalent to $f$:1.5 when $f$:1.5/1.6 projection lenses are used, and projectors are cleared for $f$:1.5.

### New Feed Design

A new design has been incorporated to minimize light loss due to shadowing by the feed mechanism, and an automatic crater positioning system maintains the tip of the burning carbon at the exact focal point of the reflector to stabilize illumination and to eliminate change of light color at the screen caused by carbon burning rates.




New Strong U-H-I arc lamp.

To facilitate retrimming, quick cleaning of the lamphouse, and to keep the reflector in efficient condition, the projectionist is expected to particularly appreciate the mirror integrated with a rear lamphouse door that swings completely out of the way.

Another feature of the lamp asserted to be of special help to the projectionist is spot focusing, stated to be exclusive with this lamp. The entire burner assembly is movable so that the position of the arc can be shifted to "feel" for the best screen light without disturbing the relative carbon positions or arc equilibrium, eliminating the necessity of moving each carbon by its independent control, and trying to keep the gap constant while watching the screen.

A built-in Expello exhaust system, cooling the rear of the reflector, permits usage of the new "cold" reflectors that allow unwanted heat energy to pass through the mirror instead of being reflected to the aperture. Also a jet stream of air stabilizes and directs the flame away from the reflector to effect better combustion and to prevent soot formation. A centrifugal exhaust fan driven by a ball bearing type motor minimizes radiation to the control booth, and heat and smoke are passed off through a large 8-inch smoke pipe.

### Fast Optics System

The new U-H-I claims an optical system that can be changed in one-fifth of the time formerly necessary, choice of high or low magnification for wide or 35-mm film being obtainable in less than a minute.

For quick interchanging between reels or for inspection, removable assemblies include the aperture filter, positive feed head, feed cluster, negative feed head, positive and negative Bodine Gear Head motors.

Heavy duty, long-life silver water-cooled positive contacts are standard for all 13.6 lamps, and air cooled or water cooled contacts are available for smaller carbons.

## 20th-Fox Outlines Aid For Small Theatres

Considering the upswing of theatre patronage that has been prevalent the past few months, 20th-Fox is launching a drive to aid small town theatres and those in subsequent run areas. This was announced by Alex Harrison, general sales manager of the company.

Besides aiding theatres now operating, the drive is aimed to open theatres closed at present. U. S. and Canadian managers have been instructed to meet with their personnel to study the small town and subsequent run theatre situation in their respective areas.

20th-Fox salesmen will be meeting with theatre operators to learn how the company can assist in hypoing public interest in pictures. To aid this operation, special campaigns have been drawn up, emphasizing that the best entertainment today can be found in movies.

Although small town and subsequent run theatres comprise only 15% of 20th-Fox's business, Harrison pointed out that they are a very important part of film distribution, and any aid possible should be extended to them. A dramatic example of the company's support of exhibitors, the general sales manager stated, was that Fox plans to release over 50 pictures this year.

A Fox survey has shown a 22.8% increase in attendance in a month over a corresponding period last year, bearing out a report by S. H. Fabian, Stanley Warner chain president, that the first week in January saw the largest theatre income for any one week since the inception of Stanley Warner.

### Altec Wins Suit

A complaint brought against Altec Companies, Inc. and National-Simplex-Bludworth, Inc. by Image and Sound Service Corporation and Image and Sound Service of New England, Inc. has been dismissed. An alleged violation of the anti-trust laws and damages asked complaint was dismissed by the U.S. District Court for the District of Massachusetts after the defendants moved for a summary judgment against the two plaintiffs.

# LETTERS TO THE EDITOR

## Focus Troubles

*To the Editor of IP:*

I always enjoy reading Robert Mitchell's interesting articles and the useful information they contain, and I would like to ask a question. Every now and then we run into a black-and-white print that is in focus on one side of the screen and out of focus on the other. We also, at times, get a black-and-white trailer in this condition, but I have never run into a color print in this condition.

Although these were not new prints, they weren't too old, either, and were in good condition. Any information you can give me will be greatly appreciated.

Oliver G. Brewer, Sr.

Starkville, Miss.

Comment: This is not uncommon, and the first impulse is to blame the lenses. But lenses are easy to check. Merely loosen them in their holders and rotate the barrel while the picture is running. If the blurry area remains on the same side of the screen while the lenses are being turned, you can be pretty sure that they aren't at fault. In your case, they very probably aren't: you say that only *some* black-and-white prints, not all of them, give you this trouble.

Is the out-of-focus effect usually on the *right-hand* side of the screen? It usually is. The shorter the focal length of the lens, the worse the blurry effect.

There's a good reason why color film doesn't give that kind of focus trouble. In the first place, color film absorbs less heat from the arc beam, and hence doesn't get as hot as black-and-white. Then, too, color film is 0.0005 of an inch thicker than black-and-white; and the slight extra thickness of color film helps *resist* deformation of the film base by heat and mechanical stress.

Heat and mechanical stress—these two factors go hand in hand to create focus troubles. By itself, heat produces a nearly *symmetrical* buckling or "pincushioning" of the film at the aperture; but when uneven mechanical stresses are present, the film is warped or twisted out of the focal plane of the lens. If only one side of the film is deformed, then that side will be blurred on the screen. But what can do this to the film? Humps and hollows in the gate film runners. In fact, even very small deviations from perfect flatness have a disproportionately great effect on the shape assumed by the film over the aperture, and hence on the focus.

The effect of worn gate runners on the focus is simply terrific with triacetate safety film, especially the black-and-white kind. You can check the flatness of the runners with a steel straightedge, directing a flashlight beam on the casting behind them to make the humps and hollows show up better. The slightest departure from perfect flatness calls for immediate replacement of the runners. It's a good idea to replace the gate-door tension pads at the same time—they may have humps where the runners had hollows, and vice versa.

The runners of the new Simplex XL curved gate aren't so critical as flat-gate runners. Curved gates keep the film steadier, and thus give consistently clear pictures on the screen. (The degree of curvature, as you know, is just about what the focal plane of the average projection lens requires.)

But perhaps your film-gate runners, or rails, aren't worn at all. Nevertheless, if they *are* unevenly worn—even if only slightly—they are very likely to produce the kind of focus trouble you described in your letter, especially if the film has been previously warped or buckled by previous projection via arc lamps or extremely high power.

## Intermission Records

*To the Editor of IP:*

Please tell me where I can buy the records which are mentioned in Mr. Toler's article on page 26 of the November issue. ("Pros And Cons On Magnetic Sound.")

We find your magazine very instructive and interesting, and it keeps us posted on important trends. Many thanks.

E. B. Wacaster

Ozark, Ark.

Comment: Mr. Toler referred specifically to George Wright's performances on the organs of the NY Paramount and San Francisco Fox Theatres. These, and other Wright recordings, are available on 12" LP high fidelity discs, and should be obtainable at any well-equipped record store or mail order house. The Paramount record is on Regent 6022. Wright is also on two other labels—on King, numbers 504 and 509, and on HiFi series 701, 702, 707 and 708. Music is the relaxing, light standard type aimed at theatre audiences.

## More on Magnetic Sound

*To the Editor of IP:*

Besides my duties as full-time projectionist here at the Hill Theatre, and as a part-time radio and TV serviceman, I have for the past several years made a study of high-fidelity sound, both from a listener's and technician's standpoint. So it is with much interest that I have read the various articles concerning magnetic and optical sound on film appearing in IP from time to time.

We have run many magnetic sound prints here at the Hill. Although the sound on these films was very distorted on many of the loud passages due to overmodulation and other causes, and the fourth track virtually unusable at times, they did exhibit a quality that has been lacking in optical recording much too long. That quality was due to the extended high-frequency response, so necessary to lend brilliance and presence to fine sound reproduction.

There is no doubt in my mind that optical recording is just as capable of rendering this extended high frequency response as is magnetic, as Mr. Mitchell pointed out. But up to now, use hasn't been made of the full capabilities of optical recording. The magnetic sound tracks gave us some of the extended range sound that people have been wanting to hear, and they immediately recognized it as something better. I think it's time we stopped kidding ourselves about what people *can* hear and *want* to hear. Sound that is attentuated above 8000 c. p. s. is dead and wanting for quality to the appreciative ear.

While it is true that response to 8000 c. p. s. does reproduce the fundamental frequencies of nearly all musical instruments, it must be remembered that the overtones and harmonies contain frequencies to over 20,000 c. p. s. These highs must not be distorted or suppressed, during amplification,

(*Continued on page* 38)

**More than fifty years ago successful attempts at recording sound-on-film were made the same time cathode-ray tube potentials were being developed.**

# Pioneer Parallels: TV and Motion Picture Growth†

## By ALBERT ABRAMSON

THE DAWN of the new century gave the world a new word, coined by the Frenchman Perskyi, "television," meaning "seeing at a distance." Until this time the familiar names were Nipkow's "Electrical Telescope," Dussaud's "Teleoscope," or Szczepanik's "Telectroscope." Now the new art of television had a proper name.

Karl Braun had perfected his cathode-ray oscillograph, and by 1902 was using it to study various electrical effects. In the United States, Harris J. Ryan of Cornell University likewise made a practical oscillograph tube and used it in his research on high tension current. Ryan found that a magnetic coil surrounding the neck of the cathode-beam tube had a focusing action on the electron beam, and that by varying both the position of the coil and the value of the current through it, an exceedingly sharp spot could be obtained upon the fluorescent screen.

Other improvements were made in the cathode-ray tube. In 1904-1905 Arthur R. B. Wehnelt developed the Wehnelt cylinder, a concentrating electrode that could be used to focus the electron beam. It permitted control of emission from the cathode and concentrated the electron beam to a small sharp beam. It also increased the number of electrons reaching the screen. Thus the cathode-ray tube was ready to be incorporated into a crude television system developed in 1907.

### *Fleming's Detector*

But first, two very important events were to take place to give electrical apparatus power and a means of amplification. In 1905 J. Ambrose Fleming took Edison's electric light bulb and added a metal plate to it. In looking for a better way of detecting the feeble radio waves of that time, he put a plate inside the glass bulb and used it as detector (Fig. 1).

When radio (Hertzian) waves were led to a plate, the negative charge tended to stop the flow of electrons from the filament to the plate. Which had the effect of cutting the radio frequency in half. This was necessary because the ether waves were sent out at two high a frequency to be audible in a head phone. The two-element tube, or diode, was known as Fleming's valve, and could be used successfully to operate headphones at audio frequency.

### *The DeForest Audion Tube*

One year later Lee DeForest improved upon Fleming's valve by adding a third element called a control grid (Fig. 2). Till this time the flow of electrons went freely from the cathode to the plate. The grid was then put in the path of the electrons and when voltage was applied to the grid, it had a tendency to stop the flow. The stronger the grid current, the fewer electrons could get by. No matter how strong the tube current, the sensitive grid could control it. It was also very sensitive to any changes in current.

This new tube, called the Audion, could do three important things. It could amplify signals to any volume required, hundreds of times if necessary. It could change alternating current to direct current. These properties were developed throughout a period of time, and even DeForest did not know what a miracle he had performed; he knew only that he had a better detector. He left a certain amount of gas in the tube in the mistaken idea that gas was necessary to make it function properly. Today the gas or air is removed, and the tubes are vacuum tubes.

During this period the infant motion picture industry was growing by leaps and bounds. Improvements had been made in the equipment used. The motion picture camera of this period (1900-1923) was a very versatile instrument. It could be used for stop motion, double exposures, dissolves, moving camera effects, and masks and iris effects—almost every effect that can be filmed today. In addition it could record either fast or slow motion, reverse action or make ordinary fades.

Improvements in the techniques of film making had also taken place. The art of editing had been discovered as well as the facility of making the screen tell a story. The use of cutting widened the scope of the motion picture and gave the screen life and vitality. It distinguished the motion picture from any other theatrical form and made the cinema a true art. The silent picture was to rise to great heights during the next decade.

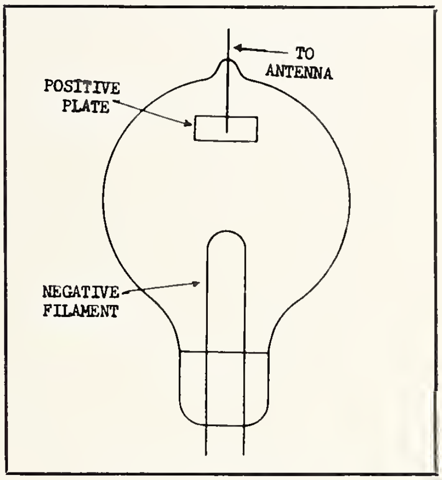



FIG. 1. Fleming's valve.

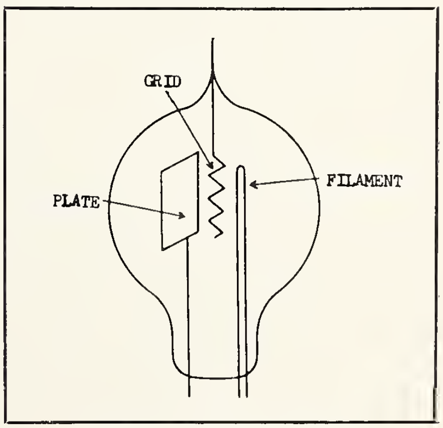



FIG. 2. DeForest's audion.

There were many attempts to add sound to the silent film. Edison had

† This article originally appeared as a chapter in *Electronic Motion Pictures*, by Albert Abramson, University of California Press, Berkeley and Los Angeles, Calif., 1955.

worked on his Kinetophone as early as 1895. In 1900 Leon Gaumont, a Frenchman, presented a phonograph and motion picture projector that were mechanically synchronized.

In 1901, Ernst Ruhmer, in Germany, acually succeeded in recording sound on film by means of a "speaking carbon arc." He passed film before a narrow slot through which the light of the flame could strike it, thus producing lines on the film which represented the sound vibrations. To play it back, an arc light was projected through the film onto a selenium cell, converting the vibrations back into electrical impulses which activated a disk to create the original sound again. Also in 1904, E. Gehricke used a glow discharge tube for the same purpose.

### *Photocinematophone*

In 1906, Eugene Augustin Lauste, a former employe of Edison's, procured a patent for a "new and improved method and means for simultaneously recording and reproducing movements and sounds." He converted his sound waves into electrical vibrations by means of a slotted diaphragm which moved between a fixed light and a fixed slotted diaphragm. This produced variations in the light falling on the film. He recorded the sound continuously ahead of the picture.

To play the film back, the varying light from the film was played onto a selenium cell, just as in Ruhmer's reproducing process. It was claimed that Lauste recorded both picture and sound on the same film and in perfect synchronization. His machine was called the Photocinematophone and was demonstrated several times in London. His patent seems to be the forerunner of the sound-recording apparatus used almost universally today.

With the progress in the motion picture industry, advancements were being made also on the television camera and receiver. In 1907 Boris Rosing, a professor at the St. Petersburg Technological Institute, invented a rather remarkable television machine. Figure 3 shows how it utilized mechanical scanning at the transmitter but employed a cathode-ray tube for the picture screen.

Rosing's television apparatus used two mirror drums in the scanner, mounted at right angles to each other. The first mirror drum scanned the scene horizontally, and the other drum scanned the image from the first drum for vertical scanning. The scanned light was directed to a photocell where it was converted into electrical impulses. The modulated electrical current was then sent by wire to a cathode-ray oscillograph which was being used as a receiver.

The electron beam was controlled by two magnetic fields which deflected the beam to bring about scanning in the cathode-ray tube. Coils placed on both drums induced currents in the deflecting coils on the cathode-ray tube and thus controlled the scanning rate in both directions.

The electrical impulses from the photocell were made to modulate the electron beam in the cathode-ray tube so that the scanning beam moved at a constant rate. This became known as the "intensity modulation" scanning method. Rosing was supposed to have given a successful demonstration of this apparatus in 1907—the first known television machine to use a cathode-ray tube as a receiver.

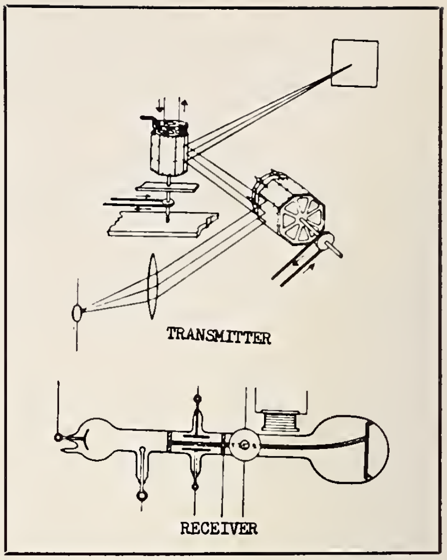



FIG. 3. Rosing's 1907 television machine.

### *Flying Spot Scanning*

In 1908 Rignoux and Fournier in France patented a method of television which introduced the "flying spot" or inverted method of scanning. This was in contrast to Nipkow's direct scanning method. They suggested scanning an opaque flat object by a flying spot of light and proposed using a selenium cell together with a lens to convert part of the varying light into electrical impulses.

This machine used the same scanning disk that Nipkow had invented but differed in the position of the light source and the light-sensitive element. In the flying spot method, an intense source of light was placed behind the scanning disk. The light went through the holes in the disk, forming a narrow moving beam which focused on the subject to be televised. As the disk revolved, the beam of light scanned the surface of the subject, and the light was reflected from the object to the light-sensitive medium.

Since the reflected light was more or less bright depending on the area being scanned, the light-sensitive element picked up a varying reflected-light input. Its output became the television signal. This system had an advantage of greater light-collecting properties but a decided disadvantage in being limited to the area that could

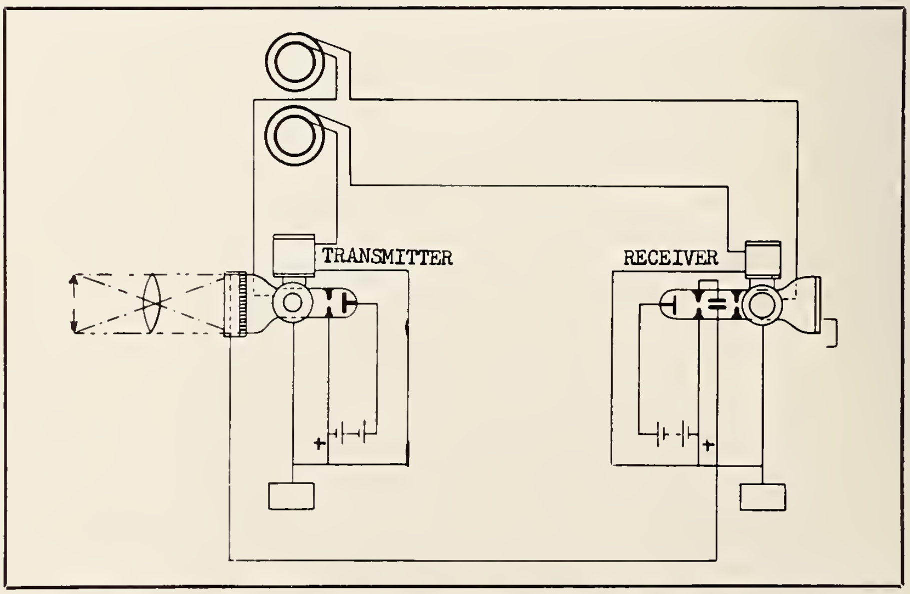



FIG. 4. Diagram of the electronic television system proposed by Campbell-Swinton.

be covered by the flying spot of light.

Rignoux and Fournier had experimented earlier (1906) with another form of elementary television transmission. They had put into operation a mosaic similar to that proposed by Carey to transmit simple patterns and letters. Also in 1906 Dieckman and Glage in Germany had proposed an early cathode-ray system using a Nipkow disk for a transmitter and a cathode-ray tube for a receiver.

### Cathode-Ray Oscillograph

During this same period in England, Allan A. Campbell Swinton was theorizing about a television system. He, too, saw the television value of the cathode-ray oscillograph and in 1908 gave some definite suggestions for the use of the cathode-ray tube as both scanner and receiver. He explained the full, improved details of his all-electrical system in a presidential address to the Roentgen Society, November 7, 1911, but he never built the apparatus described below. However, a working model was constructed by the Marconi-E.M.I. Company in 1937 for an English radio exhibition.

Campbell Swinton proposed to use a cathode-ray tube in the transmitter. The picture to be televised would be focused upon a light-sensitive plate inside the tube (Fig. 4). This plate was to be made up of some light-sensitive metal (rubidium in this case) in the form of small cubes, each cube to be separate and insulated from all other cubes. In front of the rubidium plate was to be a wire-mesh screen, connected to the transmitter.

As an electron beam scanned the back of the rubidium plate, the scanning spot discharged a certain amount of electricity depending upon how much light had struck the rubidium cube. This charge or impulse was to be transferred to the mesh screen and was thus the electrical equivalent of the light values of the picture element being scanned.

The signal was to be conveyed to another cathode-ray tube which was to be used as a receiver. In this tube there was no mesh screen or plate, but instead, a fluorescent surface on the inner side of the flared end of the tube. The incoming signal was to determine the strength of the electron beam leaving the cathode, while two magnetic fields moved the electron beam in a scanning sequence over the

(*Continued on page* 40)

# SMPTE Pledges Broader Services

The recently established Projectionists' Information Committee of SMPTE is broadening its program to educate industry technicians, Barton Kreuzer, president of the Society, announced at the year's first meeting of the board of governors in New York City.

A report by Ralph H. Heacock, theatre equipment product manager of RCA Victor division and the committee's chairman, outlined the general method by which the committee would keep projectionists informed of new developments and increase their knowledge of motion picture projection techniques. The report stated that "leading industry engineers will be invited to submit articles which deal with specific problems which projectionists must face with the new techniques. These articles will be carefully reviewed by the committee in order to insure factual, impartial information."

### Pre-Release Info

These articles will be printed in the IATSE Bulletin and in industry publications. It is possible that more detailed reprints might also be made available.

In continuous contact with Hollywood studios and with the Motion Picture Research Council, the committee will supply pre-release information on new techniques to projectionists even before prints are available for projection.

The committee will have two vice-chairmen: Merle H. Chamberlin, chief projectionist at MGM, and Gio Gagliardi, director of Sound and Projection department of Stanley Warner Management Corporation.

Committee members are: John W. Bantau, chief engineer of Fox West Coast Agency Corporation; Willy Borberg, head of the mechanical engineering department of General Precision Laboratory, Inc.; Robert P. Burns, sound director of Balaban & Katz Corporation; Lawrence W. Davee, sales manager and engineer of Century Projector Corporation; John Forde, IATSE representative, Palo Alto; Charles F. Horstman, chief projectionist of RKO Theatres; and William F. Kelley, manager of the Motion Picture Research Council.

Also, John J. Kohler, supervisor of projection for Loew's Theatres; Hugh McLachlan, theatre circuit supervisor, Y & W Management Corp.; Richard Orear, purchasing agent for Commonwealth Theatres; Lucian E. Pope, purchasing agent for Fox Midwest Amusement Corp.; Frank H. Riffle, theatre sound engineer, Motiograph, Inc.; and James C. Skinner, sound and projection engineer of Interstate Circuit, Inc.

In line with the stepped-up campaign are plans for giving added impetus to the standards activities of the engineering committees, a long-time project to effect standardization in the industry. Also, information on the Society's test film program is being disseminated for wider understanding, and designed to be more useful to the motion picture field.

A preliminary meeting of the Projectionists' Information Committee will be held in New York City in the near future, and an agenda will be prepared for a full committee meeting at the SMPTE convention in Washington, D.C. this April.



### RCA Honors 20 Employes

Twenty employes of RCA received the RCA Victor Award of Merit at a dinner ceremony last month at the Warwick Hotel in Philadelphia. The citation is the company's highest for salaried employees. About 25,000 salaried members of the firm are eligible for the award, comprising those engaged in manufacturing, service, and related activities at RCA.

With the award citations, the winners received gold money clip watches. James M. Toney, vice president and general manager of RCA Victor Radio and Victrola division, presided as award committee chairman.

**The Molteni mechanism mystery, or who got there first with shutters and intermittents?**

# The Historical Controversy of Molteni's Choreutoscope†

**By JAMES CARD**

THE RECENT acquisition by Eastman House of a Molteni Choreutoscope, fascinating precursor of the motion picture projector, once more points up the vast confusion surrounding the origins of so comparatively recent a medium.

This early apparatus made it possible to project moving images in a standard magic lantern. It is of the utmost importance in the history of motion pictures in that its construction embodies a Maltese Cross type of intermittent movement and a shutter geared to cut off the light source at the instant one image is being replaced by the next.

The device illustrated is that of Molteni, the French constructor of magic lanterns and innumerable trick attachments to simulate movement in projection. Martin Quigley, Jr. in his *Magic Shadows* attributes to Molteni the invention of the "Choreutoscope Tournant" and dates it 1865.

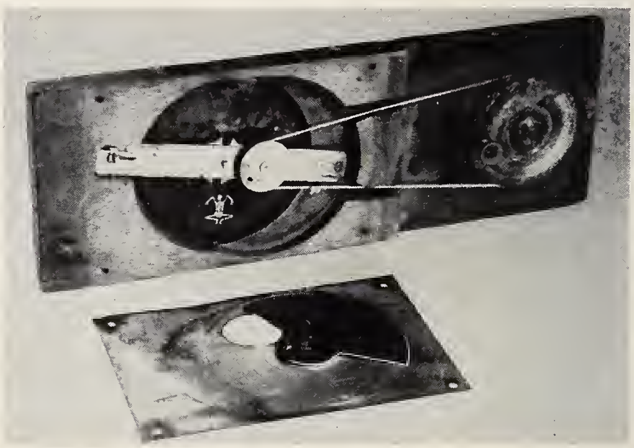
But writing in 1893, H. Fourtier in his *Les Tableaux de Projections Mouvementes*, states that the origin of the Choreutoscope was British. Since Fourtier collaborated with Molteni himself in his writing, it is doubtful that he would have been unfamiliar with the origin of the device had Molteni actually been its inventor.

† From *Image*, Dec. 1956.

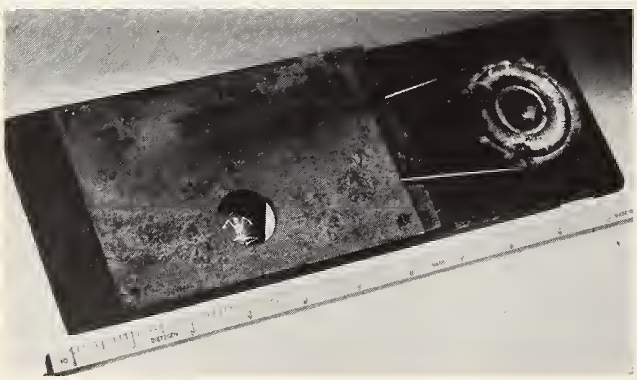
In discussing the projection of movement, Fourtier sums up the problem in such a way that should have made future inventors of motion picture apparatus much more clever about their work than they were: "We have attempted to indicate the various methods of construction employed for achieving the reconstitution of movement: these different devices have been successively applied to the projecting lantern; but in this case the problem is more complex; it is necessary, before all else, to avoid the loss of illumination: the images must form themselves on the screen during an observable length of time, substituting one for the other exactly without the spectator being able to perceive the transitional movement necessary for them to be changed. Finally, the images of each one of the phases must be separated by the more or less prolonged shutting off of the illuminating light, an eclipse during which the images may be changed.

"We shall see that these diverse conditions have been most perfectly satisfied in an *English apparatus called the choreutoscope.* The choreutoscope, the barbaric name of which comes from the Greek and signifies 'that which shows dances' was invented, or at least constructed in England by Hughe." (sic.)

Fourtier then describes a "*choreutoscope tournant qui est particulierement construit par M. Molteni.*" Both the description and an illustration furnished by Fourtier are identical to the apparatus in the possession of Eastman House.



Covering plate removed and shutter (cardboard) laid on it. In operation the shutter is attached to the small drive wheel with a pin. An arm on far side (not visible) of the drive wheel connects with the "Maltese Cross" type gear, two teeth of which appear over skeleton. This gives the stop and go movement to the metal disc with the skeletons.



The Molteni Choreutoscope. The slide proper is of wood, a metal plate covers the mechanism. The wheel at the right permitted hand operation. The white segment in the circle around the skeleton is part of the shutter.

### *Whodunit?*

But the British inventor to whom Fourtier attributes the device must have been W. C. Hughes. And Hughes did not patent the Choreutoscope until 1884—four years after Muybridge had already projected photographically-obtained images in his own zoopraxiscope.

The matter is further confused by the account of Henry Hopwood in *Living Pictures*, 1899. Hopwood attributes the "Rotary Choreutoscope" to "Mr. Beale of Greenwich." He describes Beale's "Dancing Skeleton" as follows:

"A disc was used, rotating in front of a lantern condenser; but this disc, instead of being formed of glass, was of thin sheet metal, the figures of a skeleton in various attitudes being cut

out, stencil fashion, round the margin." The Beale device, similar though it was to Molteni's (which also used a thin metal disc rather than glass to support the images) did not use the Maltese Cross intermittent. Unfortunately for the solution of the Choreutoscope's mysterious origin, it does not appear that Beale patented his device nor does Hopwood attempt to date it.

Here the trail leads to the United States. In 1869 Patent No. 93,594 was awarded to an American inventor, Brown, for a chorteutoscope device. Hopwood points out "This specification is mainly of interest by reason of the construction employed in the intermittent mechanism. It forms a very close approach indeed to the modern cinematograph with Maltese Cross motion: a star-wheel and pin being used to drive the design wheel periodically, while a two-sector shutter is shown geared to eclipse the light during the change of picture."

In 1925, Michael Coissac published his *Histoire du Cinematographe*, a work which goes to extreme lengths to give all possible credit to French originators of motion picture devices. He, too, describes the Molteni apparatus but claims only that the French inventor "perfected the choreutoscope."

### American Claim

Unless it can be established that Molteni did in fact invent the Choreutoscope in 1865 as Quigley has indicated, it would appear that priority in this significant device belongs to Brown of the United States with his 1869 patent. It is a point that should be cleared up for the Choreutoscope with its Maltese Cross intermittent is the direct ancestor of the first successful motion picture projectors which did not appear until many years later.

## "Domerama"—Theatre of the Future

*Possibly inspired by Joseph Holt's dream-theatre in the October issue of IP, a Canadian contributor has come up with this one for the future.*

By J. G. JACKSON

THE "Domerama" is a theatre of the future in the form of a dome similar to that of a planetarium, with multiple projectors covering the entire dome. The audience will sit on swivel stools in the central section of the dome, able to turn at will to view any part of the screen.

Figure 1 shows a cross section of the theatre. Projection room is in the center, number 7 projector shooting straight up to cover the ceiling section. (For illustration purposes, seven projectors are shown, although no doubt a greater number will be required.) The other six projectors cover the wall, just clearing the heads of the audience, which surrounds the projection room. A worm's-eye view of the dome indicating the areas covered by each projector is shown in Fig. 2.

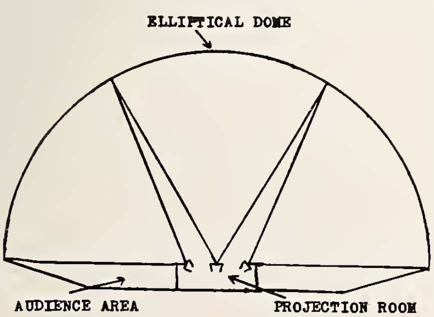



FIGURE 1

A highly directional screen will be required for Domerama since light from one section of the screen cannot be allowed to reflect onto another, tending to wash out the picture. The screen should be so designed to reflect most of the light directly into the audience area, a diffusive screen being of no use in this case.

The author has designed a total-reflection lenticular screen for use in drive-in theatres (U. S. Patent # 2,763,184) that is adaptable to the elliptical dome. With this screen there is no stray-light problem, and reflectively, light is confined to the audience area as required.

The audience area of Domerama would be small compared to the building size, but the effect of the complete surround would be most impressive. Although Domerama would not be used for the usual dramatic, story-telling pictures, for travelogues, and adventure features, the audience would get the benefit of being right in the scene.

To cite only one instance of a perfectly natural illusion:

Imagine for a moment that you are on the deck of a boat about to go under a bridge—the bridge appears in the foreground, scenery surrounding you, the sky overhead. As you proceed under the bridge it will appear overhead and you will look up to see its understructure. You proceed and the bridge fades into the background behind you. With, say, a flock of sea gulls overhead, the illusion would be perfectly natural—a type that

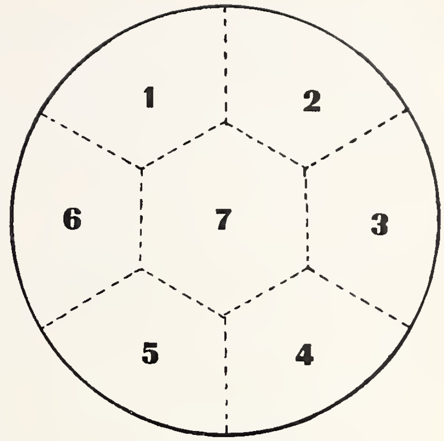



FIGURE 2

cannot be obtained by any system of projection in use at the present time.

The possibilities of Domerama are unlimited and it will become a reality only when men of vision can get together with men of finance to promote its development.

**Are You Moving?**

If so, please notify us one month in advance. The Post Office does not forward magazines. To avoid delay, please cooperate by sending us both your *new* and *old* address.

**The function of this department is to provide a forum for the exchange of news and views relative to individual and group activities by members of the organized projectionist craft and its affiliates. Contributions relative to technical and social phases of craft activity are invited.**

# *In The* SPOTLIGHT

THE recent establishment of the Projectionist Information Committee by SMPTE points out, among many things, that the projectionist is finally coming into his own. He is now being recognized by the industry as the craftsman and experienced technician that he is. Why he should not have had this recognition in the first place is beyond us, but it is, at any rate, here now.

Some of our colleagues in the publishing world have found it necessary to suggest editorially that exhibitors should consult their projectionists on questions of equipment. The gesture is appreciated, but just why it should be necessary is a source of wonderment. Considering the amount of technical experience the projectionist has to have, especially these hectic days, anyone who still clings to the notion that projection is a push-button job is back there with Stanley Steamers. And yet it is just this kind of antiquated thinking that has hurt the motion picture business.

The projectionist has had quite a number of new processes thrown at him, and has weathered them, even if he did get a litle gray over aspect ratios. Rest assured there are more new processes coming up, but perhaps this time it won't be a case of hold-your-hats-here-we-go-again. The Projectionist Information Committee has pledged that prerelease information will get to the projectionist before the prints, which procedure should have been established before this, considering that it is vitally necessary.

The fact that more recognition and stature has been added to the craft is the important thing, but sometimes it's slow in coming.

• Seven New York City movie theatres were recently struck by Local 306 when the exhibitors failed to meet their obligations to the Local's pension and welfare funds. The strike was lifted when the payments were made, according to a statement made to the trade press by Steve D'Inzillo, business representative for the Local.

• As a bit of good public relations, we applaud the example set by Local 576, Mansfield, Ohio. In an advertisement in a local newspaper, the members of the Local extended to the readers best wishes for the coming year and expressed their appreciation for past patronage at the theatres where they are employed. Assurance of "continued efficient service" was the closing line of the ad copy—evidently with the intent to induce in the reader a feeling of confidence in the technical know-how of the projectionist, plus a desire to visit a local theatre where movies are shown at their best.

• Our good friend, Bill Kunzmann, for many years traveling representative for National Carbon Company until his retirement in 1948, has a way of popping up every once in a while and letting his many friends know that although no longer active in the field, he still takes a keen interest in matters concerning the motion picture industry. Bill will be 72 on his next birthday and, as he puts it, is "enjoying excellent health and as spry as a man half my age."

A charter member of the Society of Motion Picture and Television Engineers,

Bill Kunzmann

he has attended more than 70 semiannual Society conventions. He was recently presented with a gold life membership card in the Society, an honor accorded to very few.

## 25 Years Ago—February 1932

• Harland Holmden, business representative for Cleveland Local 160, was unanimously chosen by the General executive board to the office of IA 7th vice-president. . . . Warning issued against Ralph Tagg, prohibition agent, who was using his withdrawal card from Local 591, Hagerstown, Md. as a means to gain entrance to theatres in search of evidence. . . . IA Representative William A. Dillon injured in an automobile accident. . . . Columbus, Ohio was finally chosen as the convention city for the forthcoming—31st—IA convention the week beginning June 6, 1932. . . . Two members of the

## *Social Security Disability Gains*

Increased benefits, wider coverage and a new disability plan to aid totally disabled workers went into effect Jan. 1 under amendments to the social security law voted in the last Congress.

To help meet the cost of these improvements, social security taxes paid by both employers and workers will be ¼ of one percent higher in the future. The tax is applied only to the first $4,200 of income. The maximum increase will amount to $10.50 a year.

The new rate of deduction is 2¼ percent against the 2 percent paid last year, bringing the maximum social security cost for wage earners and employers alike to $94.50 per year. Self-employed persons, whose payments are higher because there is no matching contribution, must increase their payments from 3 percent to 3⅜ percent.

All of the increased contributions will go into a special fund established to finance disability payments. Workers who are, or become, totally disabled, now are eligible to receive their social security benefits beginning at the age of 50. Children of deceased or retiring workers who have been totally disabled will continue to receive dependent's benefits after they reach 18.

Last year 60,000,000 workers and 4,000,000 employers contributed $6.5 billion to the social security fund. This year 2,800,000 members of the armed forces are being brought under the program at the new rates, and their payments will make up much of the expected $1.3 billion increase in revenue during 1957.

AFL-CIO

Sound Projectionists' Association, a rump union, received life sentences for bombing the Midland Theatre in Kansas City, Mo., in which one person was killed.

• New contracts negotiated by the IA provide for a wage hike of $3.50 per week for RCA and Altec sound service engineers. The agreement, which became effective January 2 last, also cuts the work week from 44 to approximately 40 hours.

• B. N. Burke, Local 328, Pine Bluff, Ark., has stacked up an enviable record as a long-term official of a Local Union. Recently re-elected to office, he is serving his 27th consecutive year as secretary-treasurer. The president of the Local, V. V. Vaught, boasts of holding office for 15 consecutive years, plus serving 11 years as secretary-treasurer of the Central Trades and Labor Council.

• The IA general executive board held its regular mid-winter meeting at the Bellevue-Stratford Hotel in Philadelphia during the week of February 11. Harry Abbott, president of Philadelphia Local 307 and IA 3rd vice-president, was in charge of arrangements.

## IA ELECTIONS

### LOCAL 105, LONDON, ONT., CANADA

William Hewitt, *pres.;* Jack Shaw, *vice-pres.;* Cliff Mills, *sec-treas.;* William Shaw, *rec.-sec.;* Walt Drennan, *bus. rep.;* Russ Courtney, *sgt.-at arms;* Jack McLeish, William Hewitt, J. Shaw, *trustees;* W. Shaw, J. McLeish, *auditors;* Harold Allaster, J. McLeish, *exec. board;* C. Mills, H. Allaster, J. Shaw, *exam. board.*

### LOCAL 108, GENEVA, N. Y.

E. Francis Larham, *pres.;* Arthur Gardner, *vice-pres.;* Arthur O'Neill, *sec.-treas.;* E. F. Larham, *bus. rep.*

### LOCAL 248, DAYTON, OHIO

Stanley Howell, *pres.;* James Monroe, *1st vice-pres.;* Robert Kennedy, *2nd vice-pres.;* Carrol Hathorn, *fin.-sec.;* James Catterman, *rec.-sec.;* Wilmer Roush, *bus. rep.;* Everett Espy, *sgt.-at-arms;* Henry Woodward, Frank Braun, John Holokan, *trustees.*

### LOCAL 249, DALLAS, TEX.

Guy L. Luther, *pres.;* W. R. Estes, Jr., *vice-pres.;* Harvey D. Hill, Jr., *rec. sec.;* Charles I. Cross, *fin.-sec.;* Austin E. Ballard, *treas.;* Harvey D. Hill, Sr., *bus. rep.;* Jasper Barron, Sam Hoffman, Luther Clark, *trustees.*

### LOCAL 324, ALBANY, N. Y.

Edward Wendt, *pres.;* Charles Hill, *sec.-treas.;* Rocco Memole, *rec.-sec.;* Alfred J. Antoinette, *bus. rep.;* Arthur Deitz, George Seeley, Frank Mathews, Claude Watkins, *trustees.*

### LOCAL 328, PINE BLUFF, ARK.

V. V. Vaught, *pres.;* Lewis O. Hill, *vice-pres.;* B. N. Burke, *sec.-treas.;* V. V. Vaught, *bus. rep.;* Everett Stanley, *ass't bus. rep.;* George B. Finley, *sgt.-at-arms;* Warner O. Hunter, Loy D. Gardner, E. Stanley, *trustees.*

### LOCAL 376, SYRACUSE, N. Y.

Louis R. Boyd, Sr., *pres.;* Melvin A. Denny, *vice-pres.;* George F. Raaflaub, *sec.;* Lionel B. Wilcox, *fin. sec.-treas.;* Walter M. Scarfe, *bus. rep.;* Robert J. Haven, *sgt.-at-arms;* Charles R. Nelson, Leonard H. Tondeur, George E. Doss, *trustees;* Warren E. Williams, Lawrence F. Sherman, *exec. board;* Philip T. Rossomando, *del. to Central Body.*

### LOCAL 407, SAN ANTONIO, TEX.

Gordon H. Dyer, *pres.;* W. R. Tinney, Jr., *vice-pres.;* Henry Villapadierna, *sec.-treas.;* Jerry Kusenberger, *rec.-sec.;* John D. Dennis, *bus. rep.;* Manuel Ayala, Benno Kusenberger, *members at large;* Alfred Pena, Manuel Perales, Phillip N. Wehrmann, *trustees.*

### LOCAL 735, MT. CLEMENS, MICH.

Fritz Devantier, *pres.;* Dan Defenbaugh, *vice-pres.;* Earl Natzel, *cor.-sec.;* Norman Pingel, *fin.-sec.;* Ralph Brough, *treas.;* Roy Suckling, *bus. rep.;* Shorty Bushart, *sgt.-at-arms.*



## *Your Preference?*

**What would you like most to see covered in future issues of IP? We aim to please, and what YOU want to appear in the pages of this magazine is the most important thing to us. So, if there's a particular subject (or subjects—any number) on your mind, just fill in the lines below and return to us. We'll do the rest.**

INTERNATIONAL PROJECTIONIST, 19 West 44 St., New York 36, N. Y.

**Gentlemen: I would like to see published in IP articles (and drawings) relating to the following subjects:**

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NAME .......... ADDRESS ..........

### Now It's Cinemiracle

"Cinemiracle Adventure," the first full-length feature to be filmed in the new Cinemiracle process, has gone into production. partnered by Louis de Rochemont and National Theatres, sponsors of the process.

Cinemiracle is similar to Cinerama, employing a big screen and the use of three separate negatives in filming—but it differs in that it is projected from a single projection room. Now out of the experimental stage, the process was first demonstrated over a year ago.

**The concluding installment of a comprehensive study of present-day and pioneer attempts to increase screen illumination.**

# The Faster Pulldown Geneva Movements

By JOSE M. RUIZ

THE GENEVA MOVEMENT should, at this time, be a 5-to-1 movement, and there are good reasons for this change. And some projector manufacturers are contemplating new trends in design.

In Herbert Barnett's recent IP article, "Projection Advances On the Way" (IP, May 1956), there is this interesting statement: "Much consideration is being given, therefore, to the practicability of a faster intermittent which will permit widespread adoption of the three-blade shutter where flicker is a problem. . . ." Solutions are possible, and projection manufacturers as well as projection technologists are considering the matter seriously.

In the February 1955 issue of IP, J. G. Jackson described in detail his oscillating - cam geneva intermittent mechanism, a system now employed in the new RCA color television projector to accommodate the 24-frame/sec. film rate to the 30-frame television system. This versatile movement is also feasible for cinema work. Figure 16 shows the Jackson movement as developed for RCA model TP35CC color television projector.

### *The Hortson System*

Another attempt to speed up the geneva movement is the new Hortson system employed in 16-mm projectors. This movement also falls in the Jackson category, as shown in Figure 17. The Hortson projector employs an oscillating cam and an 8-slot geneva star wheel, two gears and a drunk cam used to control the cam pin engaging action every alternating cycle. This type of geneva movement is an excellent solution to the proposed new 35-mm film with three perforations per frame. In fact, a 6-slot geneva star with an oscillating cam and an 18-tooth intermittent sprocket would make an excellent mechanism for three-perforation film.

One of the most simple and efficient intermittent movements was the Powers pin cross and cam ring mechanism. The Powers movement, as the geneva, had only two parts in motion to achieve the desired intermittent pulldown with good acceleration and deceleration characteristics. Actually, a variable pulldown action can be obtained from a drunk cam movement just by altering the grooved shape of the cam within the desired angular action. The later type of Power's movement was designed with an effective pulldown action of 5-to-1 ratio.

Two positions of the Powers movement are shown in Figure 18, which demonstrates the gentle action of the mechanism due to the creeping action of the roller pins upon the diamond ring faces. In position A of Figure 18, the pin cross had been only displaced about 15 degrees to overcome film tension. As the pin cross proceeds, the film gets an accelerated motion until the half cycle of pulldown is reached —or 30 degrees cam action as shown in position B. The cam profile is very similar in shape to the theoretical curve if plotted mathematically. Friction is minimized by the action of the rollers against the cam face, and this latter condition is an important factor in high speed intermittent mechanisms.

The smooth action of the roller pin is also recommended for geneva intermittent mechanisms, and has been widely employed by European projector manufacturers. Many European projector mechanisms employ a roller cam pin instead of the conventional simple or solid pin standard in all American machines, with the exception of the Brenkert mechanism, which employs a roller pin.

Some years ago, the writer operated a Powers Cameragraph, and in his opinion there was nothing to beat it for steadiness and efficiency, at least with

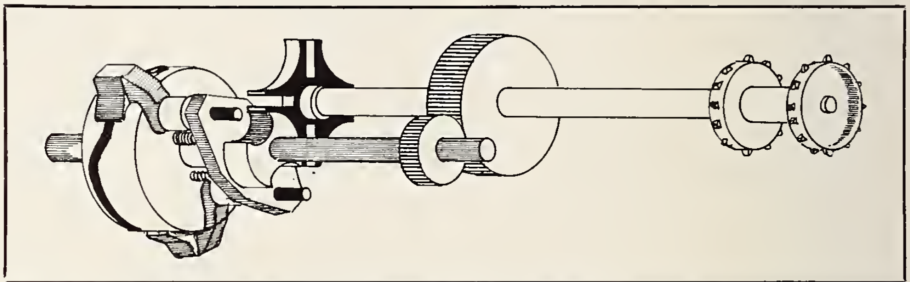


FIG. 16. Diagram of the Jackson intermittent movement developed for RCA model TP35CC color television projector.

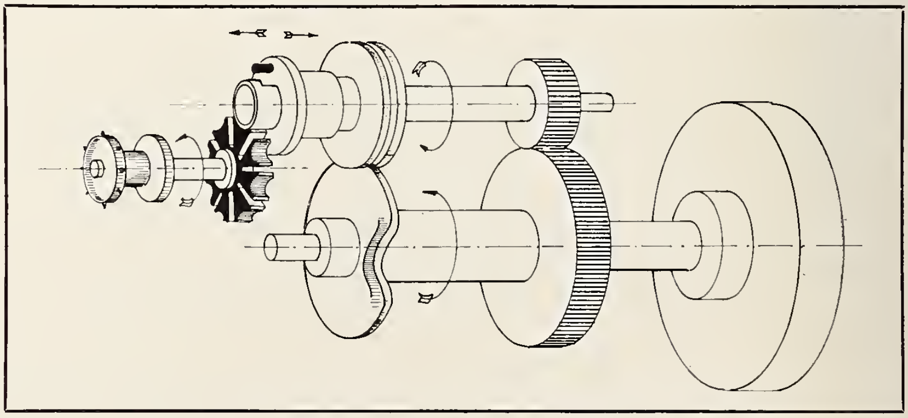


FIG. 17. The new Hortson system employed in 16-mm projectors.

smaller screens. He is also of the opinion that the Powers movement can be redesigned and employed in future equipment.

A very interesting arrangement of the Powers motion is suggested by coupling it to a suitable accelerator mechanism—as it is employed in the Radion machines—possibly making a good accelerated movement of less than 60 degree pulldown action. A Powers accelerated mechanism with a 50 degree pulldown and a flickerless type shutter of three equal blades will give us a light transmission of about 58%. In another way, if the shutter employed were of two blades, the theoretical light transmission should be near 73%; however, the use of the two-blade shutter — the "brilliant" type — gives us a light transmission of very high levels which may introduce a strong flicker . . . especially if the house is of short projection distance.

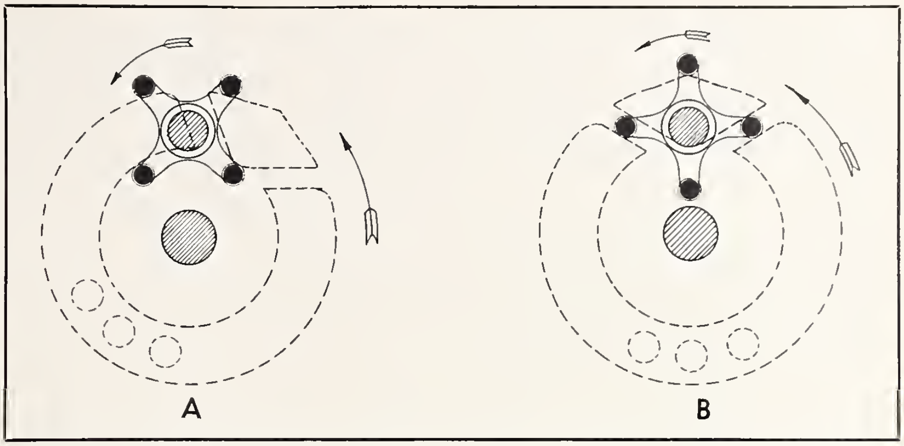



FIG. 18. Two positions of the Powers movement. Diagram A shows the angle at which the pin cross has been displaced to overcome film tension; B illustrates the 30 degree cam action.

### Pioneer Developments

To get back to the drunk cam mechanism—it has the advantage that the number of pins can be increased without altering the pulldown angle as in the geneva star case. These mechanical movements for cinematographic apparatus were tried in the past by several experimenters and inventors in the field. As early as 1896, Ademor Petit patented "A new and useful improvement on intermittent feeding devices for series photographic cameras." The Petit intermittent is shown in Figure 19.

In 1915, C. E. Wright patented a mechanical device to improve the construction of moving picture machines. The Wright movement is shown in Figure 20, and it appears that this is another pure drunk cam movement of the pin cross type.

At the present time, a very interesting 16-mm projector, the Philips EL 5000, employs a clever 12-pin movement, as shown in Figure 21. The arrow gives the action motion of the mechanism. The cam $S_1$ moves with constant speed acting upon the pins P placed in the hollow drum $S_2$. The shaft $M_2$ carries the intermittent sprocket not shown in the drawing. The intermittent sprocket has 12 teeth, and the hollow drum has 24 alternated pins. These pins are hollow to reduce the mass of the mechanism, and there are 12 short pins to 12 long. They are held in position by a clamping ring placed within the hollow drum (not shown in the drawing), in intimate contact with each other and the inside of the flange, pin spacing being accurate to within 1 to 2 millimicrons.

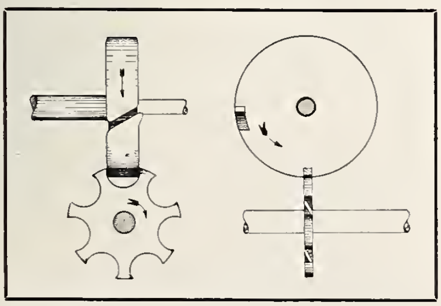


FIG. 19. The Petit intermittent movement.

A feature of this mechanism is that the grooved cam is made of Nylon, very durable and resilient; so much so, in fact, that it is possible to make the width of the grooves about 10 millimicrons less than the diameter of the pins, and so preclude all possibility of play between pins. Continuous lubrication is ensured by housing the cam and pin-drum mechanism in an oil bath.

The number of pins can be increased without altering the cam action angle, or vice versa; the angular action of the grooved cam may also be altered from 90 degrees to as short as 50 degrees.

### 16-mm Improvements

A great deal of research and experimental work has been done by 16-mm projector manufacturers on the intermittent movement of geneva and drunk cam types. In 16-mm work, the geneva star must fulfill an important, necessary requirement: the star wheel must be more than five slots—at least six. The star must be accelerated in its pulldown cycle to bring the shift period under 90 degrees cam action for efficient projection. This requirement has been solved in two ways: the employment of accelerators or oscil-

*(Continued on page 36)*

# TELECASTS

## GPL Announces New Portable TV Projector

HEEDING the increased usage of closed-ciicuit and theatre TV, General Precision Laboratories have developed a new portable TV projection system designed to throw a large picture on a wall-sized screen that may be easily viewed by groups of 100 or more. The designers of the new model PB-611A state that a specially designed optical system provides sharp, clear picture detail and greatly increased light output over earlier designs, approximately four times as bright as previous GPL models. Pictures can be projected on any size screen suitable for the premises from 6 feet wide up to 16 feet wide, or even more, it is asserted.

The added brightness of the new 611A is due to a new reflector and an advanced corrector plate design. Optical elements 12 inches in diameter providing an aperture of 0.6 are used in the projection barrel, believed to be the largest aperture with good resolution in this type of system. Redesigned to simplify adjustment, a new tube support provides easier, more accurate alignment and focusing of the projection tube, which may be positioned in any of three axes without interaction with the others.

The optical barrel is equipped with simple catches to facilitate removal of the covers for cleaning and adjustment, and can be tilted as required to allow for centering of the picture on the screen.

### *Wheeled Mobility*

The compact equipment is wheel mounted for mobility. The projection tube is protected by a special sweep failure protection circuit, and roll-out tracks provide for the sweep and control, TV receiver and low voltage power supply chassis which may be pivoted upward for access to all circuit components.

The manufacturers believe that the simplicity and dependability of the PB-611A make it eminently suitable for projection in industrial, educational, and theatre circles, as well as being able to be used directly with studio or industrial TV cameras.

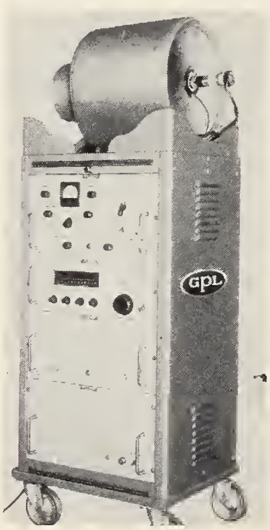
Exclusive distribution of the projection system and allied closed-circuit system has been assigned to the Tele-Prompter Corporation in what, according to H. G. Place, president of the parent General Pecision Equipment Corporation, is the largest single order ever placed for closed circuit projection systems. It is stated that over $1,000,000 is involved in the deal.

One of the first purchasers of the new projection system is the pharmaceutical manufacturers, Upjohn Company, who have recently acquired 33 of the new systems. The firm plans to use the systems to broadcast simultaneously clinical staff meetings, diagnostic procedures, surgery, and case problems to physicians in more than 50 cities throughout the country. The broadcasts will also be recorded on kinescope films for dissemination to medical societies and other professional groups both here and abroad.

## Taped TV Comes of Age

TAPE-RECORDED TV broadcasts were given a special plug during the recent Presidential Inauguration when the nationwide TV audience was presented with a demonstration of that process. Five minutes after the President had taken the oath of office, the ceremony, which had been recorded on tape, was played back over the air.

The tape system of reproducing TV programs has been in development for some time, but it has been only recently that the method has come into public use. Last November, Ampex, which has two of its Videotape recorders installed in Television City in Hollywood, taped the "Douglas Edwards With the News" program which originates in New York, and played it back to Pacific Coast audiences two hours later. This was the first taped telecast of a regularly scheduled TV program.




New Model PB-611A TV projection system developed by GPL. The portable unit incorporates a newly designed optical system which greatly increases light output over earlier designs.

The advantages of tape in this connection is that time difference between New York and the West Coast makes it awkward program-wise, since many of the major programs originating in the East play the West much too early for any appreciable audience. The previous method to correct this was to take the programs off the air by "hot kinny"—fast kinescoping process—and play it back later in the evening. But reproduction is not of the best in this process.

If the Inaugural broadcast is any indication, reproduction by tape has reached an advanced state of development in clarity and definition. What its primary use in TV is going to be is not certain yet, but taped TV is definitely here.

## Warners Plan TV Plant

CONSTRUCTION of a $600,000 ultra-modern building designed for TV activities will begin next month at the Warner Studios in Burbank, California. The structure is part of a major building program instituted by the studio.

To be in the northeast section of the Warner plant, the two-story structure will occupy a space 135 by 240 feet, and will contain 26 office suites with 130 offices, 26 fully equipped film editing rooms, and four complete projection rooms. Built on steel piers above a 100-car parking area, the building will be completely air conditioned and acoustically treated and insulated.

The TV construction will house both independent producers of filmed product for ABC-TV and Warner's own video division, which has announced an expanded program for this year.

Additional plans call for enlargement of the sudio's present TV and laboratory plant across from the main studio property. The constantly growing needs of Warner's television division has necessitated expediting the building program.

## RCA Policy on Service

A FIVE-POINT policy with regard to TV servicing has been announced by Frank M. Folsom, president of RCA. Basically the policy is aimed at the independent servicing industry and contains the following points: support of independent service industry with full dissemination of information acquired; free competition in the operation of RCA's factory service business, allowing independents equal opportunity to compete with RCA factory service; the program for procuring replacement parts and other material to be on a fair competitive basis with independents;

broad distribution of replacement parts, available to all the service industry; recognition of independent services in RCA advertising and printed literature.

Considering that servicing was a primary factor in the phenomenal growth of the radio-television-electronics industry, Folsom stated that last year the industry contributed more than eleven billion dollars to the national economy, lifting it to fifth place in American manufacturing.

The bulk of the electronics industry's servicing requirements are handled by independent service technicians. In RCA's case, 90% of all RCA Victor TV sets are maintained by independents.

## East-West TV Expands

EAST-WEST TV Network, Toledo independent suppliers of closed circuit projection equipment, has announced appointment of nine associate offices throughout the country. The current rise in use of the closed circuit medium necessitates having liaison, pricing and equipment service available in key markets, the company states.

Offices are: Trident Films, Inc., New York City; Professional Electronic Products, Inc., Pittsburgh, Penna.; Robert F. Blair, Cleveland, Ohio; Mike Bowdon, Cincinnati, Ohio; James F. Mulqueeny, Chicago, Ill.; Northwest Sound Service, Inc., Minneapolis, Minn.; Ivo Distributors, Los Angeles, Calif.; Commercial Electronics, Inc., Dallas Texas; and Mutual Electronic Supply, Inc., at Seattle, Wash. and Portland, Oregon.

The firm also announces that it has added new projection equipment which it designed and had built under its own supervising engineers.

## TV Enters Pix Deal

NTA Pictures, Inc., organized by National Telefilm Associates, Inc., has been assigned to release and distribute films to motion picture theatres in the U.S. and possessions. Headed by Erwin Lesser, vet theatre man, the firm will tee off with release of "The Bells of St. Mary's," the Ingrid Bergman-Bing Crosby film of a while back, now re-released for the first time.

The distributor's schedule for this year calls for a minimum of 12 pictures. Headquartering in New York City, the corporation has set up offices in Boston, Chicago, Los Angeles, Memphis, Dallas, Minneapolis, and Atlanta. The company states that its policy is to operate independently from the parent company, to handle only top-quality pictures, and not to be a reissue company.

NTA pictures guarantees extended clearance for theatrically released features before making them available to TV, theatre bookings being offered at least one-year protection from TV. The films will be in wide-screen ratio.

### TV Film Ratio 5:1

Five hours of film are being used for each hour of live programming on TV. This is the estimate of the Broadcast Information Bureau in the new issue of the *TV Film Program Directory*, based on reports from all stations on the air.

Not including Westerns, the number of features scheduled for telecasting has increased to 5,385. Available also are 6,172 shorts, 103 serials, 2,737 cartoons, and 611 films especially made for TV.

## SCIENCE NOTES

A LIGHTWEIGHT LADDER, utilizing sandwich construction of glass fiber and an American Cyanamid polyester resin, has been developed by the Putnam Rolling Ladder Co. Since the ladders are non-conductive and non-corrosive, they are ideal for power and electrical work in all weather and extremely durable.

* * *

A TV RECEIVER designed for ultimate simplicity has been engineered by Motorola by combining a completed circuit chassis with packaged electronic circuits originated by Centralab Co. The result is a decrease of chassis area by 20%, the combining of 97 separate parts into 17 group units, and reduction of conventional wiring by 90%.

* * *

A NOVEL TRANSISTOR-LIKE PHOTOCELL no larger than a pencil eraser has been developed by RCA. It is capable of sensing with a high degree of accuracy both direction and intensity of a light source. It performs with improved accuracy and efficiency many functions which have been handled previously with as many as four separate conventional photocells.

* * *

TRANSFORMER DESIGN METHOD, simplifying the designing of electric power transformers for engineers not normally associated with the transformer industry, has been prepared in report form by Armour Research Foundation. The report, which is the result of a project sponsored by Signal Corps Engineering Laboratories and the Wright Air Development Center, is available for $10.

* * *

A TIMING COMPONENT for lighting systems, outdoor advertising, heating plants, and certain laboratory uses, keeps running when power fails or circuits short out. Accurate to the split-second, the Duplex Time Component, developed by Industrial Timer Instruments Co., runs electrically or mechanically and does not stop upon power failures like ordinary synchronous electric motors.

* * *

A LOW TOXIC SOLVENT, called "Vythene," should increase the safety of laboratory personnel, according to the Chicago Apparatus Co. It is a non-inflammable trichloroethane with solvent properties similar to carbon tetrachloride, but of far lower toxicity. Maximum allowable concentration in air is 500 parts per million—20 times better than carbon tet.

* * *

SAFER X-RAY PICTURES can now be taken with aid of a mirror which reduces patient-exposure of X-rays by 70 to 75%. The mirror applies the same principle used by astronomers to photograph light from the stars. Reduction in exposure is made possible by the mirror's optical speed, which is between four and five times greater than that of refractive lens-type photo-roentgen cameras. GE and Fairchild Camera & Instrument Corp. are responsible for the development of mirror and camera, respectively.

## SCREEN ILLUMINATION: SOME PERTINENT FACTS

(*Continued from page* 12)

pected from 5-10% may be encountered on the sides of the screen when lamp speed equals lens speed. This generally represents a compromise between zero vignetting with its attendant higher manufacturing cost, plus factors of space, criticalness of focus, etc.

### *Optical Bench Set-Up*

From a practical standpoint, an evaluation of the effects of vignetting and other factors in a lens that tend to reduce the illumination on the edge of the screen can be made by a simple arrangement. This involves the use of an optical bench arrangement whereby the lens under examination is placed in a special mount so that it can be shifted sideways to center at any given point on a horizontal line through the center of the aperture. Readings of incident foot candles at the sides of the screen are then made with the lens centered on the aperture, and another reading is made at each side of the screen with the projection lens moved sideways off axis to center at a point on the aperture corresponding to the point on the screen at the side light meter location. Table VI shows several such comparisons that were made using different systems.

Test No. 1 shows only about 4% loss of light at side of screen in the case of lens being a little faster than lamphouse optical system.

Test No. 2 uses same components as No. 1 test except that lamphouse speed was reduced to that considerably under lens speed by reducing diameter of reflector. There is no loss at the side of the screen due to the factors under study.

Test No. 3 indicates about 11% loss in light at side of screen with lamphouse and projection lens of same numerical rating.

### *Large Light Loss*

Test No. 4 is with a lens speed rating greater than the lamphouse optics, but was made using an aperture size larger than that for which the lens was designed to cover. A 16-mm projection lens is used in conjunction with a 35-mm aperture, and the results indicate that the light loss at the edge of the screen is about 57% due to the smaller size field that the lens was designed to cover. The amount of illumination at the side of the screen with this lens centered on the side of the aperture is greater than in the same setup in Test No. 3 because of the fact that the 16-mm lens employs a different design formula and in addition has less elements.

**TABLE VI**

| Test Nos. | System Description | Incident Ft. Candles on Sides of Screen. Lens at Center of Aperture | Incident Ft. Candles on Sides of Screen. Lens Shifted to Center at Side of Aper. | % Loss at Sides of Screen Due to Lens Vignetting, etc. |
|---|---|---|---|---|
| 1 | 1 Kilowatt lamp — 40 amps. standard 35-mm aperture, *f*:2.35 lamphouse optics, *f*:1.9/2.0 projection lens. | 13.0 | 13.5 | 3.7 |
| 2 | 1 Kilowatt lamp — 40 amps. standard 35-mm aperture. *f*:4.2 lamphouse optics. *f*:1.9/2.0 projection lens. | 5.6 | 5.6 | 0 |
| 3 | Rotating high-intensity 100 amps., standard 35-mm aperture, *f*:1.7 lamphouse optics, *f*:1.7/*f*:1.8 projection lens. | 42.7 | 47.8 | 10.7 |
| 4 | Rotating high-intensity 100 amps., standard 35-mm aperture, *f*:1.7 lamphouse optics, *f*:1.6 projection lens for 16-mm projection use. | 22.5 | 52.1 | 56.8 |

## Thrillarama Opens

Having apparently solved the problems that delayed its distribution, "Thrillerama Adventure" opens this month in San Diego, Milwaukee, and Philadelphia. The Cinerama-similar process is scheduled for the National-Fox circuit which has over 300 houses, and Albert H. Reynolds, president of Thrillerama, states that the picture will eventually play every theatre in the chain. It is also slated for the Texas Interstate Circuit, first city being San Antonio, but no date has been set.

Thrillerama premiered last August in Houston to mixed reviews. Consensus of critical opinion was that scenically the process was excellent, but mechanically left something to be desired. It uses a deep-curved screen, 3½ to 1 aspect ratio, and two projectors showing simultaneously in sync. At the premiere this sync was not of the best, and half the screen jumped at times. There was also difficulty lining up the two halves, and the joining or seam where the two scenes met was quite visible. These and other problems, such as color-matching, which formerly caused some differentiation between the two panels of the screen, have all been corrected, president Reynolds claims. He adds that the show has been cut from its original two-hour length to an hour and three-quarters.

Thrillarama's main advantage over other spectacular processes, the company asserts, is that its equipment is easily portable, and can be set up in a theatre overnight. Design changes have purportably made the process effective in theatres with projection angles up to 20 degrees. A 380-pound aluminum screen frame is used, in contrast to the more than 2,000-pound steel frame used at the premiere.

## 5,000,000,000 Feet of Color

If there were a projector that could run 105 years without stopping, it would take it that long to show the five billion feet of Technicolor film that has been processed and manufactured to date. Dr. Herbert T. Kalmus, president of the company, recently announced that Technicolor release prints have passed that ten-figure mark. Most color prints for any one film were for—no surprise—"Gone With The Wind": 2,000 Technicolor dye prints totaling approximately 41,000,000 feet of film.

GRIPES? PROBLEMS? SEND 'EM IN.

# Projection CLINIC

## Removing and Replacing Heads

MOST projector mechanisms of American manufacture are secured to the sound reproducer by means of two bolts or cap screws. In the case of modern soundheads, the screws are installed from the sound reproducer up into the mechanism base; certain older soundheads employ screws inserted through the base of the mechanism into the soundhead.

In the former case—the bolts being inserted up into the mechanism from the soundhead—it is sometimes difficult to reach the square or hexagonal heads of the bolts by means of an ordinary wrench. Special wrenches are supplied for this purpose. When no suitable wrench is available, however, long-handled gas pliers with inclined gripping jaws may be used (Fig. 1).

Long-handled pliers are always handy things to have in the projection room, as the long handles provide great lever-

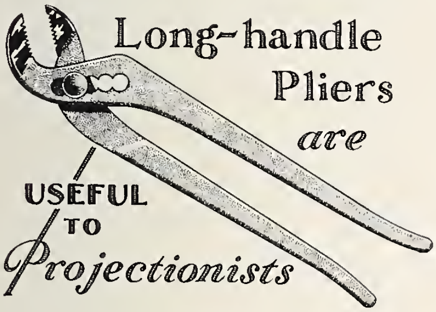



FIGURE 1.

age and make it easy to reach out-of-the-way nuts and bolts on the heavier pieces of equipment.

When replacing projector mechanisms, mesh the soundhead driving pinion with the main drive gear of the mechanism before tightening the two bolts or screws that hold it in place. Move the mechanism about if the screw holes are oversize, finding the position where the gears mesh perfectly and the mechanism is in line with the lamphouse. Then tighten the screws.

Certain older sound reproducers require the use of shims between the top of the soundhead and the bottom of the picture mechanism. If such are used, note their placement when removing the head and replace them exactly as they were. To eliminate the shims may throw the mechanism out of perfect optical and mechanical alignment when the screws are tightened. This is particularly true of the old Western Electric soundheads on "universal" projector bases.

## Carbon Arc Still Supreme

THE HIGH-INTENSITY carbon arc is still the best illuminant for theatre projection. The light source (positive crater) is very small in size, thus permitting the highest degree of optical efficiency. It is extremely bright and not too expensive to operate. Moreover, the color of the light may assume any desired tint, depending upon the chemical composition of the flaming core of the positive carbon. Positives giving a sunlight-white light are used for 35-mm projection.

The carbon arc nevertheless has a few disadvantages. The carbons burn up rather rapidly, necessitating frequent trimming of the HI arc lamp. Special mechanisms are required for feeding the carbons exactly as fast as they burn away and for maintaining a constant position of the positive crater. To do away with these nuisances of arc-lamp operation, attempts have been made to replace carbon arcs with incandescent lamps, metallic arcs, and gas-discharge tubes. The xenon bulb comes within the last-named category.

The xenon bulb is made of quartz and contains the rare gas xenon (atomic number 54) under a pressure of about 10 atmospheres when the bulb is cold, 30 atmospheres when heated by operation. When lighted, a small fan-shaped blue-white arc is instantly established between two massive tungsten electrodes. The electrodes cannot be brought together, so a "striking voltage" of 25,000 volts is required. This high voltage is automatically switched off as soon as the bulb begins to burn normally at an operating voltage of from 20 to 30 volts.

Xenon bulbs for projection consume from 25 to 70 amperes, depending on their size, and are rated from 500 to 2,000 watts. The 40-amp., 1,000-watt bulb has been widely used in the smaller theatres of northern and central Europe. Only a small theatre *could* make use of the xenon bulb, for that matter, as the light output is no greater than that from a medium-sized low-intensity carbon-arc lamp!

### *Xenon Light-Output*

Specifically, the light-output from a running projector having coated $f$:1.9 lenses, standard aperture, is only 1,800 lumens with a xenon bulb in a regular mirror-arc lamphouse. This assumes a current of 35 amps. for a new bulb, 43 amps. for one near the end of its 800-hour life. Xenon bulbs are blackened by evaporated tungsten from the electrodes as they grow old, hence the recommendations of manufacturers to operate them at decreased current when new and maximum current when old for equalized light output.

The cost of operation, including bulb replacements, is greater than that of LI carbon arcs and about equal to that of the smallest HI arcs including the cost of carbons. Moreover, even the smallest "simplified" HI carbon arcs using 7-mm positives has greater light-producing

power! LI arc lamps produce from 1,000 to 2,500 screen lumens; simplified HI arc lamps from 3,000 to 6,000 screen lumens. Regular HI carbon-arc lamps give from 12,000 to 48,000 screen lumens, and even more than 50,000 lumens have been obtained with the most powerful lamps (experimental) combined with $f$:1.5 optics!

The light of the xenon bulb is decidedly bluish, resembling that of an equal-energy source such as a B-type star. The spectrum of the xenon lamp reveals that its radiation extends into the near ultraviolet, and is flat through the visible region (from the highest visible violet to the lowest visible red). There are sharp peaks of great intensity in the near infrared. These might introduce film-heating difficulties if only the xenon bulb had greater luminous power. Fig. 2 shows the xenon spectrum superimposed over the spectrum of the HI carbon arc.

It is obvious that the xenon bulb, good as it may be for very diminutive theatres and previewing rooms, cannot compete with the HI carbon arc for the illumination of gigantic wide screens.

## Projecting "Green" Prints

FRESH laboratory copies — "green" prints—require greater care in projection than is sometimes accorded them. Overoiling of prints is harmful in some ways, uncorrected "sticking" in other ways. Prints are often badly soiled by applying oil to their perforation margins as they run through the projector. Then too, oiling first one edge and then the other induces sidesway of the projected picture.

The troublesome phenomenon of sticking is due to the melting of soft, moist emulsion in the hot projector gate. The melted gelatine collects upon the steel film runners or tension shoes and bakes to form hard, shell-like deposits which usually leave a broad longitudinal scratch along the middle of each row of perforations.

As the gelatine softens and melts, the film slips so readily that it overcomes the gate tension and overshoots on the intermittent sprocket, producing violent jumping of the picture on the screen. But the moment each fresh deposit of gelatine begins to harden, the moving film is held back, severely straining the perforations.

To avoid excessive film damage, a jumpy picture, and noisy operation, a few projectionists even go so far as to squirt large quantities of oil all over the film, hit or miss, the moment it beings to chatter. The new print is thereby soiled and often scratched by the grit it picks up. In addition, the oil is vaporized by the heat of the gate and condenses upon the back surface of the projection lens, fogging it. The picture on the screen then looks very misty indeed!

Film laboratories usually wax or otherwise lubricate the perforation margins of freshly processed prints on the emulsion side. Methods of film lubrication have improved in recent years, greatly minimizing sticking during the "breaking-in" period—the first six projections. Silicone waxes mixed with carnauba wax are especially efficacious; and the use of a thin lacquer coating on the emulsion surface gives good results and eliminates the need for sticky film waxes.

### *Velvet Runners*

Users of Ernemann projectors have velvet gate runners at their disposal. These are intended for use when brand-new unlubricated prints are run, though many projectionists keep them on all the time to minimize the conduction of heat from the gate runners to the margins of the film. Velvet runners are a godsend when special prints are run for previewing purposes. Such prints may subsequently be used by film editors for "work prints" or master copies; and they don't want them messed up with either oil or wax.

But when sticking *does* occur, it must not be allowed to continue. The sprocket holes may become chipped or torn, shortening the life of the print and making the picture unsteady. If sticking is experienced frequently, the projector gate tension may be too high. Reduce it to a total of eight or ten ounces. To eliminate sticking entirely, lay each reel of the new print on the rewind bench, apply oil to the edges of the roll through the openings in the reel flange, then turn the reel over and oil the other edge of the film. Only a mere *trace* of oil is needed—just a dab on the tips of the fingers. Enough of it will work into the perforation margins to prevent sticking, yet leave the soundtrack and picture areas unsoiled.

*Do not oil film in the projection room unless sticking has been experienced with the first reel during the first showing!* The remaining reels of the photoplay can be lubricated while the first reel is running; the first reel after it has come from the projector. Then you can be sure of having a smooth-running show during the next performance, and be confident that you have not oiled the print unnecessarily.

The projector gate must be cleaned

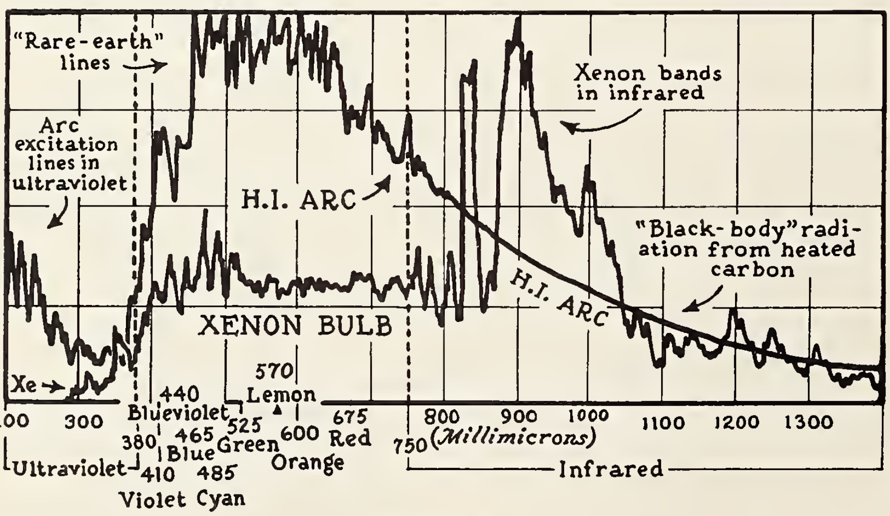



FIGURE 2.

after running each reel of a green print. Use an orangewood stick (sold in drug and department stores for cleaning fingernails) or a small "chisel" of soft copper for scraping off deposits of hardened emulsion. *Never* use steel: it scratches the smooth surfaces of the gate runners and aggravates sticking. Remove deposits of wax and emulsion from the teeth of the intermittent and sound sprockets with a stiff-bristled toothbrush lightly moistened with kerosene.

### Film-Cement Stains

IT OCCASIONALLY happens that film cement gets spilled upon clothing. Now, film cement contains dissolved film base (cellulose triacetate), and hence dries to a stiff mass. Solvents for film base such as acetone, chloroform, and dioxane may be used successfully to remove film-cement stains from shirts, pants, neckties, and dresses (in the case of exchange inspectresses), but only if these items of apparel are made wholly of *natural* textile fibers. However, when rayon or nylon (artificial) fibers are present in the cloth, the applicaiton of film-base solvents produces a much worse, *and absolutely irremediable*, stain.

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### TOA, TESMA Agree

After a good deal of discussion and a near-collapse of plans, Theatre Owners of America and Theatre Equipment and Supply Manufacturers Association have come to terms regarding their proposed joint convention in Florida next November.

Settling certain issues about profit-sharing, the two organizations have made what was a tentative agreement permanent. although papers have not been signed, and exact details have not been disclosed.

The double convention is slated for late November in the new $17.000.000 Americana Hotel in Miami Beach.

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### RCA's Light Amplifier

An electronic amplifier of light which amplifies by up to 1,000 times the brightness of projected light has been developed by RCA. A present application of it is in the form of an amplifying fluoroscope for industrial x-ray use.

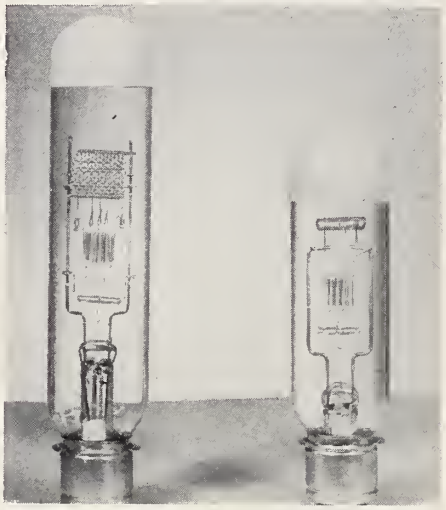
This is one of the research developments done in the past year, RCA announces. Others include a magnetic tape recorder for both color and black-and-white TV for broadcast use, a home magnetic tape player which plays TV programs through standard TV receivers, and an electronic cooling-heating system that works in silence and has no moving parts.

## New Products for the Industry

A Brighter Tungsten Lamp, designed to fit existing 1000-watt 16-mm projectors, has been announced by the Lamp Division of Westinghouse Electric. Rated at 1200 watts, the new lamp was originally designed for use by the armed forces where difficulty is frequently experienced in illuminating portable screens big enough to be viewed by large groups. According to Westinghouse engineers, tests indicate 25 to 30 per cent more screen lumens to be obtained due to improved optical fill and increased efficiency. Nearly two inches shorter than other 1200-watt lamps, the new product, which is known as Model T-12, has the same filament size as 1000-watt lamps.

Some of the important advantages of the lamp, according to Westinghouse, are that it permits the efficient use of wide screens in 16-mm projection of CinemaScope and Vistascope films. In other applications, such as daylighted school rooms, the lamp will have a distinct advantage.

The compact filament used in the T-12 was made possible by the development of new methods of drawing tungsten wire and a "floating-bridge" filament construction developed by Westinghouse. This design allows the placing of the coils close together without danger of shorting when the filament expands upon heating.



New Westinghouse 1200-watt projection lamp (right) is compared with bulkier predecessor.

The 1200-watt lamps will be available this Fall, and will be made with the medium pre-focus base, the Bell and Howell base, and the DC medium ring for base-up burning.

A new 500-watt slide projector, equipped for remote control use in auditoriums, is available from the GoldE Mfg. Co., Chicago, manufacturer of many products for projection-room use. Feature of the projector is its newly designed changer which handles all types of mounts and which operates by means of a push button at the end of a 15-foot remote-control cord. Unlike other remote-control changers, this projector, known as the Auto-Mark, instantly operates as a manual automatic projector as well, without the use of gears or clutches. Individual slides can be projected without using the magazine or accessories.

An RCA "honeycomb screen," known as a directional viewing device, has been developed by Dr. George L. Beers, an executive of RCA. The screen is claimed to make possible "increases of up to 20-to-1 in picture contrast under adverse ambient light conditions." This would allow good picture presentation in artificially or naturally lighted theatres or auditoriums. The device is similar to honey-comb structure, made up of a network of tiny interconnecting cells. It is fabricated with aluminum foil, and a wide range of viewing angles can be obtained by varying the cell width, length and depth. It is believed that this new idea is more applicable to portable 16-mm use than to theatres.

"Stip-Tex", a stipple-textured paint developed by the Spatz Paint Industries, has been introduced on the market, and is now in use in some drive-ins. The paint, when applied with a heavy lambswool roller, simulates the texture of rough cement. Features claimed for the new product are that it requires only one coat, doesn't collect dirt, and gives a clearer picture from any angle in the drive-in.

New Ace Film Splicer. The Ace Electric Mfg. Co., New York, announces that it has completely redesigned its "Clear-Vision" splicer which handles both acetate and the new "Cronar" polyester-base film. The Ace Clear-Vision Splicer operates by means of "Mylar" splicing tape instead of cement.

A clear non-warping lucite pressure plate has been incorporated in the new model to permit unobstructed visibility during the splicing operation. Cutting blades are of a special heat-treated stainless steel. Piano hinges run the full length of the splicer and are securely fastened to insure permanent alignment. Splicing-blade carriers, set in the pres-

sure plate, are free running and return to safe rest position automatically when the plate is raised.

Register pins are located to conform with ASA/SMPTE standards. Both straight cut and diagonal splices are possible. Also, the pins will handle the perforation dimensions of both standard and CinemaScope film. By means of a thumb screw, one or both rows of register pins can recede into the base of the splicer, making it possible to handle any film width from 16- to 70-mm.

Hinged arms on both sides of the working plate are an additional feature of the new model. This improvement holds the film down so that work is uninterrupted during the splicing operation. Retail price of the splicer is $69.50.

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A NEW CATALOGUE of its entire line of professional magnetic tape recorders is being offered free by Magnecord. Inc., of Chicago. a division of Midwestern Instruments, Inc.. Tulsa, Okla. It contains 15 pages of complete specifications and information on all models, illustrated with photographs, plus data on accessories and modification kits. It may be obtained by writing the factory at 1101 South Kilbourn Ave.. Chicago 24, Illinois.

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## PERSONAL NOTES

EDWARD M. WARNECKE, former SMPTE eastern regional membership chairman. has been appointed the Society's national membership chairman for 1957-58. Noting that SMPTE membership has increased 20% in the past two years, Warnecke stated that the committee will be devoted to explaining the activities of SMPTE and the advantages of membership. Warnecke is assistant chief engineer of the East Coast Division, Motion Picture Film Department, Eastman Kodak Company.

* * *

W. DONALD CLAYTON, formerly motion picture technical representative for the Du Pont Company in the Boston district, has been transferred to the New York district where he will serve trade and industrial customers. A graduate of Syracuse University where he majored in business administration. Mr. Clayton has been with Du Pont since 1948.

* * *

DR. RAYMOND L. GARMAN, formerly a vice-president of General Precision Laboratory Inc., has been elected to the new position of executive vice-president and technical director of that organization. Another former vice-president, JAMES W. MURRAY, has been elected executive vice-president and general manager. also a newly created post. Promotions are in line with general expansion of facilities for research, development and production at GPL.

Dr. Garman, associated with GPL since 1945, will be in charge of technical administration of the company, and Murray. former vice-president and general manager of the RCA Victor record division, will be responsible for all phases of manufacturing and administration.

* * *

JOHN I. CRABTREE, after 43 years with Kodak Research Laboratories, is retiring. The well-known authority on photographic chemistry was feted with a dinner in his honor. Founder of the applied photography division of Kodak. Crabtree has garnered many honors, among them the Gold Progress Medal of the SMPTE, for which he also served as president in 1930-31. He has published 160 papers on photographic subjects, and just recently he received the Progress Medal of the Photographic Society of America, the society's highest award.

* * *

HARRY B. RUBLE, Du Pont X-ray products technical representative in Seattle. has been named sales supervisor for all Du Pont photographic products in the Dallas district. Ruble has been with the Du Pont Photo Products Department since 1947, and is a member of the Society for Nondestructive Testing and the American Society of X-ray Technicians.

* * *

HAROLD M. EMLEIN has been appointed the manager of the theatre and industrial products department of RCA, succeeding J. F. "Jack" O'Brien. who has advanced to manager of RCA's Northeastern Region. With RCA since 1930, and for the past ten years manager of RCA's Indianapolis plant, Emlein will be responsible for the planning, engineering, marketing and sales of various broad RCA product lines, which includes sound, projection, and accessory equipment for indoor and drive-in theatres. In 1949. Emlein was awarded the RCA Victor Award of Merit. the corporation's highest award for salaried employes.

* * *

E. Z. WALTERS, comptroller of Altec since its formation in 1937, has been elected that corporation's financial vice-president. He will also continue in the post of supervising vice-president of the subsidiary Altec Lansing Corp. in Beverly Hills, California. His successor as comptroller is C. R. RININSLAND, former head of the tax department for both parent corporation and subsidiaries.

* * *

GORDON D. HIATT has been appointed assistant superintendent of the cellulose acetate development division at Kodak. With Kodak since 1936, Hiatt has done extensive work in the cellulose acetate development field, including various papers and patents on the subject.

## GENEVA MOVEMENTS

*(Continued from page 27)*

lating cam movements. The first solution has been demonstrated in the preceeding article (IP, December 1956), and the second expedient is the Jackson oscillating cam movement. There is a third variant, the Hortson system, with an 8-slot geneva star actuated by a common cam in turn actuated by a drunk cam, as shown above. It may be adjusted from the lowest pulldown time to one as rapid as a 30 degree cam action.

For 35-mm, all the above described are practical with minor alterations in design and construction requirements. The accelerated geneva star such as the Radion II mechanism, the simple 60 degree eccentric star wheel, and the old and efficient Powers movement seem to this writer at least to be the most practicable intermittent devices to be employed in present equipment.

On the other hand, the drunk cam family such as the Philips, the GPL, and the Holmes projector movements could be adapted to 25-mm operation.

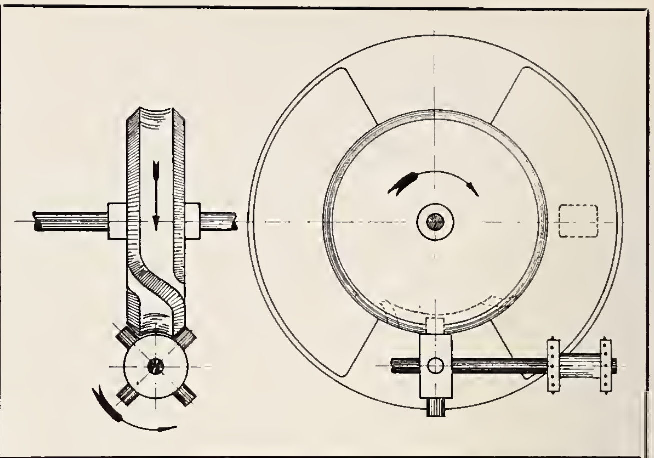

**FIG. 20. The Wright drunk cam movement of the pin cross type.**

And, while the Jackson and Hortson systems are somewhat complex from the mechanical point of view, they are adaptable for 35-or 16-mm work.

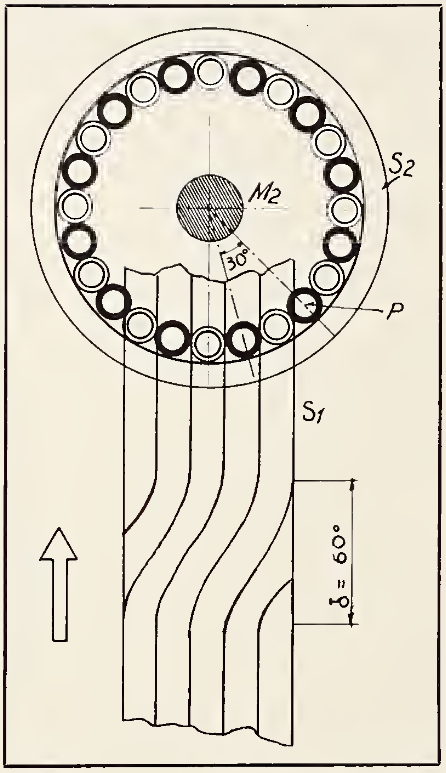


**FIG. 21. The 12-pin movement employed in the Philips EL 5000 16-mm projector.**

To conclude—faster pulldown intermittent conversion movements in conjunction with narrower shutter blades, simplified stereophonic systems, correctly chosen arc lamp mirrors as well as modern anamorphic projection lenses — all these point the way to efficient film projection. That is, after all, one of the major factors in the existence and preservation of the motion picture industry.

**[THE END]**

### Cinerama Quits Oklahoma

The Warner Theatre in Oklahoma City will revert to a regular motion picture house this month as Cinerama bows out of the city. The Stanley Warner chain, apparently feeling that the operation had reached the saturation point, removed it. The slight pickup in business when "Cinerama Holiday" succeeded the original "This Is Cinerama" did not justify continued operation of the process which has been installed there since last May. The equipment will go to Havana, Cuba.

Stanley Warner has assured its stockholders that it will continue expansion of Cinerama, but principally in theatres outside the United States. It is possible that there will be expansion here when a mobile unit, designed to be set up and disassembled inexpensively to present short runs, can be developed.

## OBITUARIES

WILLS, CECIL, 62, member of Local 380, Oklahoma City, Okla., died early last month after a brief illness. A charter member of the Local, he had been employed for many years as projectionist at the 20th-Century Fox screening room in Oklahoma City. His widow and two sons survive.

• • •

BUSKIRK, CEYLON CLARK, 49, charter member of Local 744, Cadillac, Mich., died recently at the Community Hospital in Big Rapids, Mich. In addition to his projection work at the Big Rapids Theatre where he had been employed since 1921, he also owned and operated Buskirk's Print Shop in Big Rapids for the last 20 years. Buskirk served with the U. S. armed forces in Italy during World War II. He was a member of the American Legion, 40 et 8, held membership in the Fraternal Order of the Eagles, and in Veterans of Foreign Wars.

• • •

AKINS, OTTO, 56, member of Local 249, Dallas, Texas, succumbed to a heart attack. For the past eight years he worked as chief engineer for the Hardin Theatre Supply Co. of Dallas, and prior to that was associated for about 17 years with the Interstate Circuit. He was buried with Masonic services.

• • •

QUINN, T. M.. 38, member of Local 400, Alexandria, La., died December 26. He suffered a heart attack in Jackson, Miss., where he worked for five years as field engineer for RCA Service Company. A graduate of the University of Houston, he served with the U.S. Navy during World War II. He became a member of Local 400 on August 5, 151. He is survived by his wife, a son and a daughter.

• • •

DOUGLAS, ROLAND C., 56, member of Detroit Local 199, died recently from injuries sustained in an accident. He was very popular in Detroit projection circles and had a varied and colorful career in show business,—from working as vaudeville performer to advance man for the old Barnum and Bailey circus. Survivors are his wife and a son.

• • •

GAVIN, ROBERT J., 62, member of Local 511, Jacksonville, Fla., died after a brief illness. A member of the Local since 1919, he worked for many years as projectionist at the Capitol Theatre in Jacksonville. He is survived by his wife and son, Robert, also a member of the Local.

## Attack Road Towers

Because of alleged distractions to passing motorists, roadside drive-in screens are once again the object of highway authorities' attention. U.S. Commissioner of Public Roads, Charles D. Curtiss, in reporting to the executive committee of the American Association of State Highway Officials, proposed strict state licensing of drive-ins to control placement of screens. Curtiss stated that he had recently taken a tour as "just another motorist," and had noticed that an increasing number of drive-in screens were visible enough from the road to divert a driver's attention.

In the past few years some states have threatened legislation on screen placement. In those areas where such legislation was agreed to be confined to just future outdoor installations, exhibitors offered little opposition. But certain states insisted upon removal and replacement of existing offending screens, and outdoor operators opposed vigorously, pointing out that the cost of removal and realigning of screens would be ruinous.

In conclusion, Commissioner Curtiss proposed that the drive-in industry be given a chance to "police itself" before legislative action is taken.

### PATIENCE, PLEASE . . .

**Robert A. Mitchell's Manual of Practical Projection will be off the press about mid-March. IP has been offering this must-reading at a special pre-publication price of $4.50 per copy—but note that word *pre-publication*. That means that the offer applies only to cash orders received *before* the book is off the press. To those of you who have already sent in your checks, many thanks, and you'll get your copy directly the book is out. For those who haven't ordered as yet, please remember that on publication date the cost of the book reverts to its original publication price of $6.00 per copy.**

## LETTERS TO THE EDITOR

(*Continued from page* 18)

except for purposes of equalization, and should be reproduced by special high frequency "tweeters." If noise in the high frequency region must be suppressed, some means other than killing the high should be employed.

I believe that for practical purposes, if theatre sound systems were built to have flat response from 40 to 15,000 c. p. s., a considerable improvement would be made over the present sound quality. Most people, including myself, hear to well over 15,000 c. p. s.

As to the comparison between optical and magnetic sound, I believe there should be little difference in the reproduced sound quality of the two, though for many reasons the optical method is far more practical for theatre use.

E. W. Anderson

Hillsboro, Oregon

Comment: Mr. Anderson's analysis of the optical-versus-magnetic question is valuable and, in many respects, typical of the reactions of those engineers who look skeptically upon the use of magnetic tracks on release prints. The distortion mentioned by Mr. Anderson is quite common, but is more often due to such factors as track deterioration, worn magnetic clusters, etc., than to actual overmodulation (a factor difficult to measure except in the case of variable-area optical tracks and phonograph records).

True, CinemaScope magnetic sound is theoretically capable of *slightly* superior results when the tracks are new and the reproducers are in perfect condition, but the advantage over optical sound is not great enough, in my opinion, to be heard by even the most sensitive ear and, moreover, rapidly vanishes as the tracks (and the reproducers) undergo use.

The use of revised standards for optical-sound recording slits and scanning beams is under consideration, with ¼-mil recording and ½-mil reproducer scanning beams being favored. At the present time, ½-mil recording slits and 1 and 1¼-mil reproducer scanning beams are generally used. With the adoption of the narrower slits, modern fine-grain recording stock and release positive will make possible optical frequency response up to and including 20,000 cycles.

Optical sound played via 1-mil scanning beams (an older standard which is being restored) is fully capable of level response from about 40 to 8,000 cycles. Attenuation is only 1 db at 9,000 cycles, 2 db at 10,000, 15 db at 15,000. There is no response beyond 18,000 cycles. CinemaScope magnetic sound, on the other hand, is capable of level output from 30 to 9,000 cycles with 1 db attenuation at 10,000 cycles, 15 db at 15,000. and 22 db at 20,000 cycles. Noise becomes rather bad at 15,000 cycles with only 15 db attenuation in a system having an overall dynamic range of 60 or 70 db.

Noise level is an important consideration. The noise level of CinemaScope sound (at its very best) is only slightly less than that of optical sound in the 7,000—10,000 cycle range. At very low frequencies (30—60 cycles), optical sound is definitely superior. The noise level of *perfect* CinemaScope tracks in the main frequency range (100—5,000 cycles) is slightly less than is the case with optical tracks, even when these are unscratched.

It is truly deplorable that optical tracks are not reproduced at full wide range in most theatres. For that matter, CinemaScope tracks aren't, either! We spoke above of frequencies as low as 30 to 60 cycles. Very few theatres reproduce this low from any type of track. Furthermore, some high-frequency attenuation is usually necessary to reduce shrillness and to prevent echoes—an acoustical problem.

Modern optical tracks made from magnetic originals are capable of reproducing from 30 or 40 cycles to 10,000 cycles, as stated above; but most theatres—even

those boasting "wide-range" sound systems—reproduce only from 60 or 70 cycles to 8,000 or 9,000 cycles. Old-style tracks made from optical originals and dubbed duplicates demanded a somewhat restricted range to "squelch" distortion and noise in the higher frequencies.

The admittedly slight advantages of CinemaScope-type magnetic tracks are quite unavailable to the average user because of track deterioration and other factors pointed out in the August and September issues of IP. In actual practice it is found that attenuation begins in the 5,000—6,000 cycle range (even lower when the sound magnets are worn!) and becomes serious at 9,000 cycles even though *some* response at higher frequencies is retained. Response in the 10,000—12,000 cycle range is often very feeble—so feeble as to be unheard by the audience.—R. A. M.

### Report from Down Under

*To the Editor of IP:*

Just a few lines from down under in Australia to let you know what's been happening in this part of the world. Around Melbourne, drive-ins are everywhere but here in Sydney they have just made a start. However, we expect six drive-ins to open in this region in about two months. Most of these are being built through a joint effort by the two largest exhibitor chains, and there is considerable controversy as a result because independent exhibitors are finding it difficult to obtain licenses to operate drive-ins. Some changes in government policy may be coming.

Drive-ins here follow almost the same operation plan as in the States. It gets dark here quite early in the evening, even during the summer season which we are now enjoying, making it possible to put on two shows a night, starting at 7:30.

After the recent Olympic games, the biggest thing to happen in Australia this year was the introduction of TV. There are three stations operating in Sydney and the same number in Melbourne. Since hotel bars in Sydney are allowed to remain open until 10 p.m. instead of the usual 6 p.m. closing time general in this country, a number of people sit around these bars watching TV and drinking until closing time.

The price of home TV sets is very high—varying from $400 to $600—but people are buying them on time, paying about $60 down and $4 a week. The effect of home TV on theatres is not noticeable at present, but we know that the situation will change. By next winter it is believed that theatres will feel the pinch, particularly in the suburbs.

By the way, I hear that they are not putting in any more four-track CinemaScope sound systems. The public doesn't appreciate the difference between magnetic and optical reproduction. We also find that some of the novelty associated with the big screen has worn off and that the houses that get the business are the ones that play *good* pictures.

In closing, let me wish you and the IP staff a Merry Christmas and a Happy New Year.

IVAN BAILUE

Sydney, Australia

### Projection Porthole Glass

*To the Editor of IP:*

I very much desire to follow the suggestion made in IP's November Projection Clinic column and use optically flat projection porthole glass. I am lucky enough to be working in a year-round air-conditioned projection room at the 31 Drive-in Theatre here, but I still need port glasses to keep out excessive dust and east wind.

I have contacted B & L and American Optical, but I have not been able to locate optically flat glass of 9" x 11" dimensions. Can you give me the name of a company that can supply me with this size glass?

HARRY P. SMITH

Cullman, Ala.

COMMENT: Optically flat glass of the high quality required for projector ports may be obtained in any desired size, and either uncoated or coated, from National Theatre Supply, which has branches in all principal cities. The branch nearest Cullman, Alabama, is at 187 Walton Street, N.W., Atlanta 3, Georgia.

We are advised by NTS that optical

glass of the 9" x 11" size, *uncoated*, is priced at $14 per plate. If the anti-reflection coatings are desired, $25 should be added for each coated surface, that is, a total of $50 for both sides in addition to the price of the glass alone.

High-quality optical glass, such as that sold by NTS, transmits approximately 92% of the visible projection light. When anti-reflection coatings are present on both sides, the transmission is increased to 97 or 98%—a greater increase than can be obtained by trimming the blades of the projector shutter down to the irreducible minimum. Moreover, pictorial contrasts are increased to give a brilliant, sparkling picture when coated projector-port glasses are used. These glasses should be kept clean at all times, dirt and dust being removed by the same methods employed for cleaning fine projection lenses.

## PIONEER PARALLELS

(*Continued from page* 21)

fluorescent surface. Thus an image would be reproduced on the surface of the receiving cathode-ray tube as a result of the fast-moving electron beam activating spots on the fluorescent surface.

### *Iconoscope Beginnings*

Campbell Swinton's disclosure was most important because it revealed for the first time a camera tube with a form of storage action. Some twenty-two years later Zworykin was able to demonstrate a camera tube which utilized this storage principle, the introduction of the Iconoscope.

In 1911 Boris Rosing was continuing his work with the cathode-ray tube. He discovered that the speed of the electron beam had an effect on the brightness of the spot it produced. Whenever the spot on the screen was moving fast, the line it produced appeared dim; whenever it was moving slowly, the line appeared bright. Thus the apparent brightness would be inversely proportional to the speed of the beam as it swept the face of the tube. He therefore proposed a new principle of scanning of "velocity modulation" for varying the intensities of a picture tube instead of the earlier system of intensity modulation. However, because of many difficulties, most present-day methods use the intensity modulation method rather than Rosing's velocity modulation. A notable exception is the Eidophor Projector which uses velocity modulation for scanning.

In 1910, A. Ekstrom in Sweden patented a method of television which used the flying spot principle of scanning. This was done independently of the earlier work of Rignoux and Fournier in France.

During this period the sound picture had a flurry of activity. In 1909 some two hundred theatres in England were featuring some form of talking picture. Edison had continued his work on his talking picture apparatus, and by 1912 his Kinetophone had nearly perfect electrical synchronization.

The Institute of Radio Engineers was formed May 13, 1912, by a merger of the Wireless Institute and the Society of Wireless Telegraph Engineers.

In 1914 some of the first vacuum tube direct current amplifiers were developed by Irving Langmuir in the United States.

### *"The Birth of A Nation"*

The motion picture industry was growing in stature with the work of D. W. Griffith. In 1915 and 1916 he released two of his greatest masterpieces, *The Birth of A Nation* and *Intolerance*. These films were a monument to the young art of the motion picture and showed what could be done by a master craftsman. Griffith's

contributions to the cinema cannot be overestimated. He used every device at his command—the closeup, the "switch-back," sustained suspense, the fade-out, and restraint in expression. He was a master at cutting and editing and raised the motion picture to one of its highest peaks.

In July, 1916, C. Francis Jenkins founded the Society of Motion Picture Engineers. The purpose of this organization was "the advancement in the theory and practice of motion picture engineering and the allied arts and sciences, the standardization of mechanism and practices employed therein."

The United States entered World War I in 1917, and the motion picture industry continued its growth. The radio industry expanded rapidly and was improved immensely. But the infant art of "seeing at a distance" was in a period of dormancy.

### *RCA's Inception*

Radio became very important during the war, and the United States government realized that much of the control of wireless communication was in foreign hands. As a result, the Radio Corp. of America was formed October 17, 1919, when General Electric bought out the American branch of the Marconi Co. Then Westinghouse Electric of Pittsburgh bought out all the wireless patents that were still available and set up its own subsidiary to engage in wireless communication. However, Westinghouse joined the RCA cross-licensing setup in June, 1921.

The start of the 1920's found only one radio station in the broadcast field, station KDKA, Pittsburgh. But growth in radio broadcasting came rapidly and by the end of 1922 there were some 217 licensed stations on the air.

In 1923 Lee De Forest was working on a method of recording sound on film. He was using methods similar to that employed by Lauste for recording sound. However, he had the advantage of being able to use vacuum tubes for amplification. He also used loud speakers in conjunction with the screen image. His system was called the Phonofilm and was first demonstrated publicly at the Rivoli Theatre in New York City, April 12, 1923.

In spite of the demonstrations, De Forest was unable to interest any of the major film producers in his system. The motion picture was a success without it. Sound must wait for a more opportune moment.

## THAT OPTICAL TRAIN

(*Continued from page 9*)

on the film aperture, it can be understood that the elliptical lamp mirror functions exactly like the condensing lens of the condenser-type optical system.

When a large, thin converging lens is used in conjunction with the lamp mirror, the mirror must have a *parabolic*, not an *elliptical*, type of curvature. This is the curvature required for searchlight and auto headlight reflectors. It has the unique property of collecting the light from the source and reflecting it in essentially parallel rays.

The parabolic mirror system minimizes the light loss caused by the shadowing effect of the positive carbon holder. In the elliptical mirror system, the light beam becomes smaller and more concentrated as it travels from the surface of the mirror to the image of the source at the aperture. It is considerably constricted at the place occupied by the positive carbon holder, and hence is rather seriously obstructed by that unit. A beam of greater diameter, as, for example, the beam of parallel rays produced by a parabolic mirror, suffers far less loss of light by shadowing.

### *Parabolic "Spread"*

The parabolic mirror system, however, has two disadvantages. The large converging lens wastes about 10% of the light by reflection and absorption. The closeness of the large lens to the picture aperture results in a greater "spreading" of the light rays which emerge from the aperture, requiring a somewhat faster (more expensive and optically less satisfactory) projection lens to intercept and utilize them.

Whereas in the parabolic system the mirror *collects* the light and the large

lens *converges* it, the mirror of the elliptical system performs the twofold function of collecting and converging. A similar distinction of functions is made in condensing-lens systems: the lens nearest the arc is the "collector," and the lens nearest the aperture is the "converger."

### Illumination Efficiency

What about the relative illumination efficiencies of mirror and condenser arc lamps for motion picture projectors? Reflector lamps having *f*:2.0 or *f*:1.9 16-inch mirrors and *f*:1.7 18-inch mirrors are extremely efficient with rotating positive carbon trims burning up to 135 amperes. The total light output from a projector using these elliptical mirror lamps (projector shutter not running) ranges from 15,000 to about 30,000 lumens, depending on the current used, the optical adjustment of the arc lamp, and the speed of the projection lens. (Lenses of *f*:2.0 or *f*:1.9 are standard, faster lenses having unsatisfactory focus characteristics.)

The highest powered mirror lamps, represented by the Strong Super "135" and the National Excelite "135," have photoelectric crater-positioning systems which experience has shown to be *absolutely necessary* for steady white light and consistently high optical efficiency in rotating-positive mirror lamps.

Light outputs higher than 30,000 lumens from mirror lamps have been reported by manufacturers; and at least one of these newer lamps, the Gretener "Ventarc," has substantiated the claims made for it. This lamp burns 12-mm Ultrex positives with a revolving graphite disk negative at 230 amps., and requires special and very elaborate cooling means. The light output is more than 65,000 lumens.[1]

A light output of 50,000 lumens claimed for an ordinary 18-inch mirror lamp burning 13.6-mm regular positives at 160 amps. (described in IP with appropriate "words of caution"[2]) has not yet been confirmed by any independent authority. Indeed, one of the larger lamp manufacturers feels very strongly that the use of 13.6-mm carbons with *ordinary* lamp mirrors does not result in more light unless wide-film projector apertures are used.

### Durable Heat Filters

Modern condenser lamps are ably exemplified by the Peerless Hy-Candescent lamp having *f*:2.0 aspheric condensers and an efficient absorption-type heat filter. This type of heat filter has been found by test to be more durable and, in the long run, more effective for projection purposes than the unstable dichroic type. Burning 13.6-mm regular positives at currents ranging from 125 to 180 amps., the Hy-Candescent furnishes from 12,000 to 25,000 lumens of steady, uniformly distributed white light. Automatic crater positioning devices are not necessary in condenser lamps because condensing-lens systems are optically much less critical than reflector systems, and operate satisfactorily with a minimum of attention from the projectionist. Condenser lamps are used whenever the highest quality of brilliant picture illumination is desired.

"Simplified" HI mirror lamps burning copper-plated non-rotating positives at currents ranging from 40 to 75 amps. supply from 5,000 to about 15,000 lumens, and are suitable for small and medium size indoor theatres. They are more difficult to operate than rotating positive HI lamps because the positioning of the negative carbon must be adjusted frequently to insure even burning of the positive crater.

[1] "Gretener Ventarc for Todd-AO" by Joseph Tritsch, IP for November 1956, p. 7 *et seq.*

[2] "Better Light from HI Reflector Arcs" by R. A Mitchell, IP for November 1956, p. 14, *et seq.*

[TO BE CONCLUDED]


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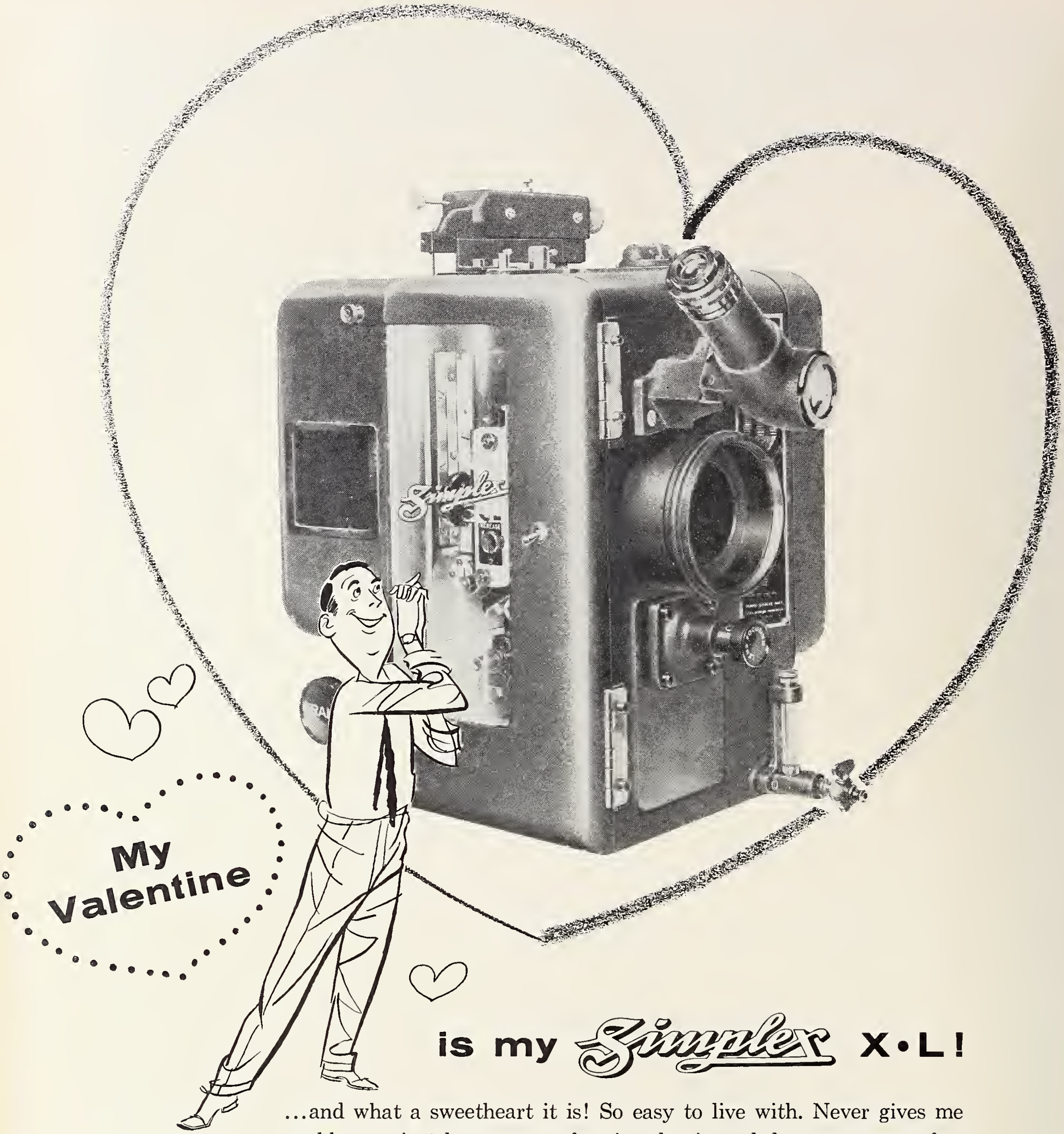
My Valentine

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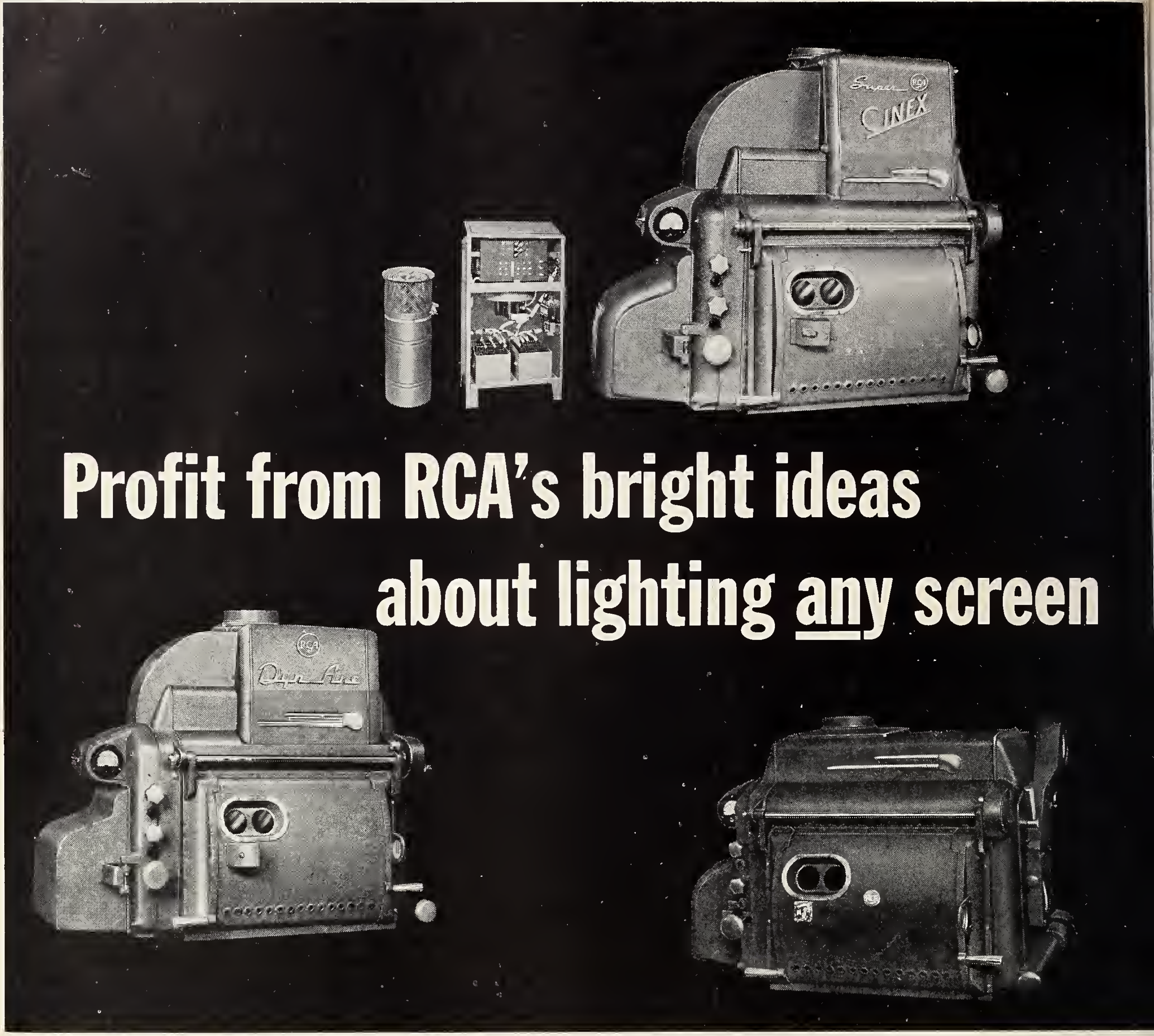


# Profit from RCA's bright ideas about lighting any screen

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# International PROJECTIONIST

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**Volume 32 MARCH 1957 Number 3**



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# *Monthly Chat*

## This Side of the Curtain

WE HAVE always considered that the name of this magazine is a pretty good example of straightforward, informative simplicity—an entity in itself, like a finely-machined tool: there it is, and there isn't anything more you can do to it to improve it. That, we think, is pardonable pride, because those publications that name themselves Bee, Mountain Echo, Nugget, etc., though they be excellent, are not publications concerned with Bees, Mountain Echoes, Nuggets, etc.

But the sign out front says International Projectionist, and it means what it says: our concern is the projectionist, and we consider him internationally. Granted the globe on the cover shows the Western Hemisphere, and granted that the bulk of the material that appears in this publication is from American sources, still the material is not aimed solely at an American audience, and IP's pages have always been open to any competent contribution from any nation.

There is a certain international cooperation among technicians that is far more tranquil than what goes on in the UN headquarters a few blocks from this office. That is, most of the time.

All this is by way of pointing out that a good deal of the articles coming in here lately have been from across the waters, and we will pass them on to you on this side, as, we hope, in the past we have passed on *our* information overseas. Let's encourage hands-across-the-seas swapping of ideas.

But, funny . . . although we hear so much about the marvelous technical developments going on behind the Curtain, we have yet to hear a smidgin of cinematic news from the Enlightened Ones.

How about that?

## No More Donnybrooks?

SOME FAMILIES just can't get along without scrapping among themselves. Everybody's all of the same interest, but there's a clash of temperament and/or money, and the ball opens. What is known among our shamrock-wearing brethren as a Donnybrook.

But—let an outside danger threaten that same family, and it turns a united front to face that danger. Consider the overnight unification of this country after Pearl Harbor.

Well, the motion picture industry had its Pearl Harbor some time ago, but the inter-family squabbles just went right on, just as if it were the good old times when every day was Saturday, and every Saturday New Year's Eve. So the competition moved right in and stole the family silverware.

" . . . guilty by default by not organizing the remedy." We quote S. H. Fabian, Stanley Warner chain president, who should know.

But at this writing there is encouraging news. MPAA president Eric Johnston has set up a steering committee on arbitration among TOA, National Allied, and representatives of exhibition.

The next time we're filling up space in this column, let's hope we have even better news. Cross your fingers.


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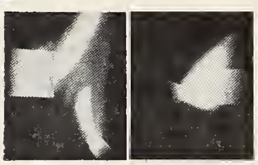

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INTERNATIONAL PROJECTIONIST

Volume 32 MARCH 1957 Number 3

# That Important Optical Train

By ROBERT A. MITCHELL

**Descriptions of various optical systems coupled with some practical advice on the care and maintenance of lamphouse-to-lens installations conclude this series.**

MAZDA incandescent lamps are ideally suited to small projectors when the projected picture does not exceed 4 or 5 feet in width; but the shape of the glowing tungsten filament is a source of annoyance in conventional motion-picture systems.

As it was explained in the preceding installment, the light source is imaged upon the film aperture in these systems. Even though the filament image is somewhat blurry, the glowing filament wires nevertheless show up on the screen as discolored streaks with vertical shadow-bands in between them.

This defect of mazda projection is partially overcome in ordinary projectors (1) by utilizing a "semi-stereopticon" system with the film aperture closer to the condenser than is the case in the more efficient theatre-projector systems, and (2) by placing a concave spherical mirror behind the bulb to form an image of the filament in the plane of the actual bulb filament.

Carefully adjusted, the spherical reflector "fills in" the spaces between the filament wires with the filament image. This expedient also increases the light on the screen from 20% to 60%, depending upon the reflectance of the mirror and the transmittance of the glass bulb envelope (which is rather low in bulbs that have become perceptibly blackened by evaporated tungsten).

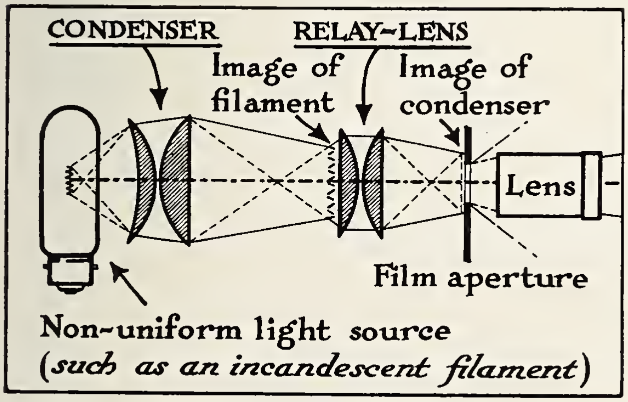



FIG. 1. The Koehler "relay-condenser" system designed to avoid irregular screen illumination for film projection when the light source is large or irregular in shape, as is the case with mazda bulbs and xenon tubes. The source is imaged by the condenser upon an intermediate relay lens which, in turn, images the evenly illuminated condenser upon the aperture.

But even the spherical mirror fails to eliminate the irregularities of the light source entirely in true motion-picture optical systems. *Consequently, a different type of optical system* is necessary for perfectly smooth and uniform screen illumination when mazda lamps are used for motion-picture projection. The Koehler "relay-condenser" optical train, illustrated by Fig. 1, is such a system.

In the Koehler system, the lamp and condenser are moved farther back from the picture aperture, and an intermediate "relay" lens of appropriate diameter and focal length interposed between them. The lamp filament is imaged by the condensing lenses upon the relay lens, and the relay lens, in turn, images the *uniformly illuminated* condenser upon the aperture. The extra lens normally wastes about 10% of the light (only 2%—4% if antireflection-coated), but this is a low price to pay for a smoothly lighted screen with mazda lamps.

### *Hot-Spot Problems*

Relay-lens systems are, of course, unnecessary when the light source is uniformly brilliant, like the positive crater of the low-intensity carbon arc. The crater of the high-intensity arc, on the other hand, is brightest at its center, the brilliancy falling off rather severely toward its edges. Unsatisfactory light distribution across the face of the HI positive crater is the chief reason why the corners and sides of HI-illuminated screens are often noticeably less bright and somewhat more reddish or brownish than the middle area—the "hot spot." This trouble is most prominent when HI positive carbons of small diameter are burned.

The hot-spot effect of HI illumina-

tion can be overcome by forming a *highly magnified* image of the crater upon the aperture, utilizing only the central portion of the light-emitting crater; but this expedient is wasteful of light. It has been tried with fair success, however, by burning 13.6-mm positive carbons in 18-inch mirror lamps having the usual magnification ratio employed for 9-, 10-, and 11-mm positives. Even so, the oversize "spot" of wasted light on the aperture plate heats the back of the picture mechanism unduly, making water cooling of the film gate a necessity.

Application of the Koehler relay system to HI carbon arcs at once suggests itself as the logical remedy for the troublesome hot spot with dim, discolored corners and sides. But serious difficulties are encountered when the Koehler system is applied to reflector arcs. The positive carbon holder and the hole in the middle of the mirror are imaged by the relay lens upon the aperture!

To solve this problem, the German firm of Zeiss Ikon devised an ingenious optical system which effectively eliminates shadowing while retaining the obvious advantages of the Koehler principle. This is a method worthy of study because it has been successfully applied to lamps of Zeiss manufacture and widely used in European theatres.

Instead of a single intermediate lens, there are two "lens plates" in the lamphouse cone, the one nearest the arc mirror having a "raster" of about 150 rectangular-shaped convex lenses embossed in it, and the one nearest the aperture the same number of hexagonal convex lenses. Known by the German word for "honeycomb condenser" (*Wabenkondensor*) on account of the appearance of the hexagonal-lens plate, this interesting system is illustrated by Fig. 2.

### *Wabenkondensor Operation*

Here is how the Wabenkondensor works. The elliptical arc-lamp mirror throws a light forward in the usual way, but the beam is intercepted in the lamphouse cone by the rectangular-lens plate (A in Fig. 2). Now, each of the 150 rectangular lenses focuses a tiny image of the arc mirror upon the corresponding hexagonal lens of the hexagonal-lens plate (B in Fig. 2).

Each hexagonal lens, in turn, images one of the evenly illuminated rectangular lenses upon the picture aperture, the image ("spot") having the same shape as the conventional 3:4 or CinemaScope aperture, and only a trifle larger. The overall effect is the superposition of approximately 150 rectanglar "spots" upon the film aperture. each uniformly illuminated. Partial shading of a portion of the rectangular-lens plate by the positive carbon holder thus has no effect upon the uniformity of aperture illumination.

The Wabenkondensor is well suited to "simplified" HI arcs burning the smaller carbons, as these lamps can give uneven and discolored screen illumination. Moreover, the Wabenkondensor renders focal positioning of the positive crater less critical, minimizing uneven, discolored screen light even when the positive crater has wandered from its optimum focus. Only the distance separating the two lens-array plates is critical, but this is fixed by their mounting arrangement, and is never changed.

The Wabenkondensor is also suited to light sources of irregular area, such as the xenon lamp, used in mirror lamphouses. When the xenon-discharge bulb is used in condenser-type lamps, the simple Koehler relay-lens arrangement should be employed.

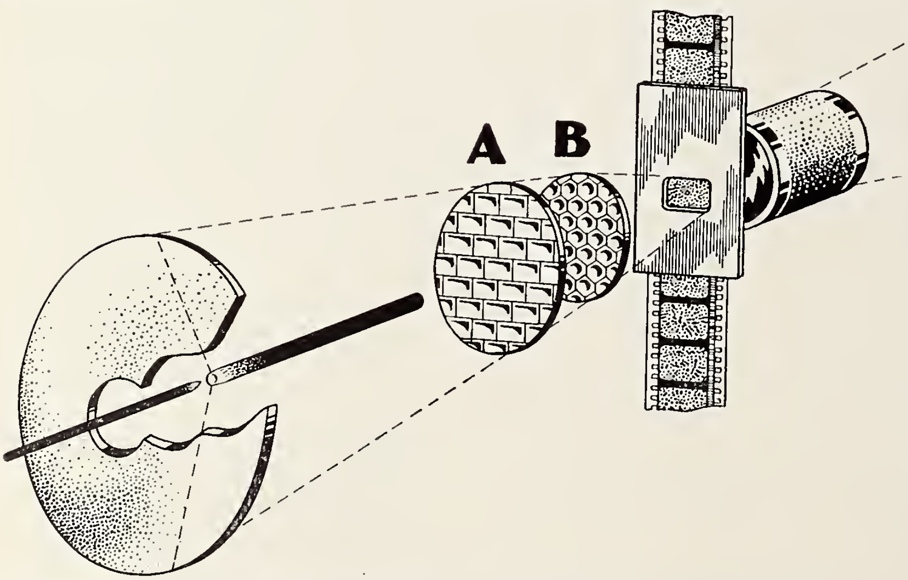



FIG. 2. The Zeiss Ikon *Wabendondensor* ("honeycomb condenser"), an ingenious modification of the Koehler relay system for mirror arcs. The simple relay system cannot be used because the positive carbon holder and the hole in the middle of the mirror would be imaged upon the aperture.

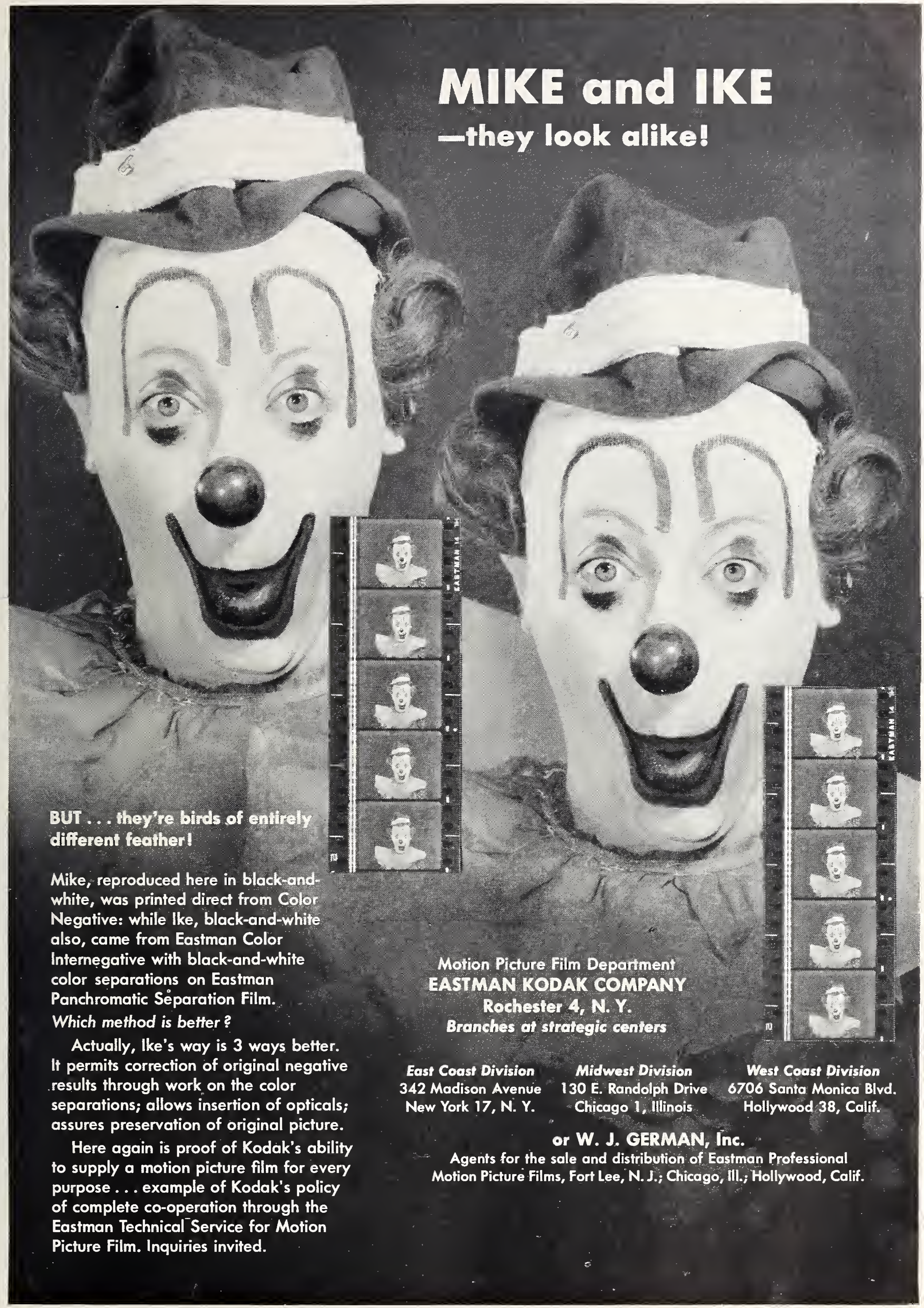
The hexagonal-lens plate B images the numerous rectangular lenses of the rectangular-lens raster A upon the aperture, superimposing the 150 separate images for even illumination. The slight loss of light occasioned by the two lens plates is more than compensated by the light-saving rectangular "spot."

### *Light Spreading*

As stated in Part I, motion-picture optical systems occasion a more or less serious loss of light due to "spreading" of the light rays passing through the film aperture and emerging from the other side. (The rays passing through the slide aperture of a stereopticon do just the opposite: they keep on converging until they come to the projection lens.) This troublesome divergence of the outermost rays was shown in the drawings accompanying last month's installment. Unless projection objectives of high speed (large diameter) are used, light is lost by failure of the lens to intercept and send to the screen the rays which come from one edge of the lamp mirror (or condenser) and pass close by the opposite edge of the picture aperture.

To overcome this optical defect of conventional motion-picture systems without using excessively large projection objectives (expensive and handicapped by small "depth of focus"), Zeiss Ikon introduced another innovation, the "picture-aperture lens" (*Bildfensterlinse*) for use in Ernemann projectors. This is a small convex lens made of heat-resistant quartz positioned directly behind the film aperture, as shown in Fig. 3.

The success of the Bildfensterlinse is due to its bending of the light rays into an essentially parallel beam between the aperture and the projection objective. It performs this feat by fo-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Mike, reproduced here in black-and-white, was printed direct from Color Negative: while Ike, black-and-white also, came from Eastman Color Internegative with black-and-white color separations on Eastman Panchromatic Separation Film.
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cusing upon, or in, the projection lens a small, reduced image of the bright arc-lamp mirror, thus producing an optical effect somewhat similar to that of a stereopticon system. (The projector optical train is "motion-picture" from the arc mirror to the aperture lens; "stereopticon" from the aperture lens to the prejection lens.)

### A Light "Funnel"

The projection objective lens, therefore, need be no larger than the mirror image formed by the Bildfensterlinse. *All light is "funneled" through this reduced image of the arc mirror.* It is to be noted that no "aerial image" of the arc mirror is formed in front of the projection lens when the Bildfensterlinse is used. This is another point of resemblance to the standard stereopticon system.

The aerial image is a natural occurrence in almost all motion-picture optical systems, including the Koehler relay and the Wabenkondensor systems. The projection objective not only projects a magnified image of the film upon the distant screen, but also functions secondarily in the manner of a camera lens, forming from 1 to 4 or 5 inches in front of itself a reduced image of the lamphouse mirror or condenser.

The exact size of the aerial image depends upon the focal length of the lens and the diameter and distance of the lamp mirror. *The diameter of the projection lens has nothing whatever to do with the diameter of the aerial image!*

As a rule, the aerial image is a trifle smaller than the cross section of the lens, particularly in the case of short-focus lenses. When this is the case in projectors having front shutters, the shutter should be positioned on its shaft at the point where the light beam is intercepted in the plane of the aerial image. Light cutoff is the most rapid at that point, permitting the shutter blades to be trimmed to minimum width (from 90° to 95° in drive-ins; from 95° to 100° in indoor theatres).

### Determining Image Plane

To determine whether the aerial image is substantially smaller than the lens, blow cigarette smoke into the light beam issuing from the projection lens. An hourglass-like constriction of the issuing beam means that the aerial image is smaller than the lens. To find the exact plane of the aerial image, hold a small blackened square of sheet metal an inch or two in front of the projection lens, moving it in or out until a sharp image of the arc mirror or condenser is formed upon it. (If the reflector lamp is used, the hole in the mirror will be seen, and an image of the positive carbon holder will extend down from the *top* of the brilliant disk because the image is inverted.)

If the lamps and projector lenses were purchased at different times, there may be a substantial difference in the optical speed ratings of the two. If the projection objective be "faster" than the lamp mirror (e.g. an $f$:1.9 lens with an $f$:2.5 lamp), well and good. The efficiency of the projector optical train will then be near its maximum, so far as light pickup by the lens is concerned. If, however, the lamp system be faster than the lens (an $f$:2.5 lens with an $f$:1.7 lamp), light is certainly being wasted by failure of the too-small lens to intercept the entire beam of light which emerges from the film aperture.

### A Speed Fallacy

Now, then, consider the case of *equal* speed ratings—an $f$:1.9 lens with an $f$:1.9 lamp mirror, for example. Are the two components optically "matched"? The answer is a definite *no!* even though it is commonly assumed that they are.

As we have said many times before, a lamp having the same speed *rating* ($f$ number) as the lens is really *faster* than the lens! And when the lamp is optically more rapid, light is always wasted and the film needlessly heated by oblique rays which the lens, being too small, cannot use. Moreover, a lamp of greater optical speed than the lens increases the hot-spot effect—a bright center in the projected "field" with falloff of light toward the sides of the screen.

It is indeed true that equal $f$-speed ratings would represent a condition of optical match in orthodox motion-picture systems *if the aperture were a mere pinhole,* which, of course, it is not. With an aperture of appreciable area (the diagonal of the usual 35-mm film aperture is approximately 1 inch in length), true matching requires a lens of greater speed rating than the lamp—a lower $f$ number. There is a mathematical formula for this; but instead of reproducing it again, we shall explain the matter so that the basic principle involved will be easily understood.

### The Pinhole Aperture

Consider, first, the simple pinhole aperture. If the lamp has a speed rating of $f$:1.9, an $f$:1.9 lens will match it exactly, intercepting all of the light issuing in diverging rays from this pinhole aperture.

Assume that the pinhole happens to be located at one corner of a real

(*Continued on page* 39)

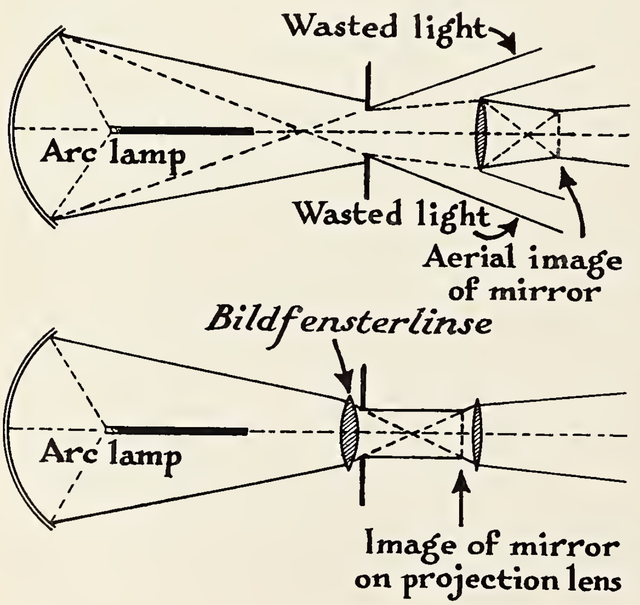


FIG. 3. A common mirror-arc system with and without the Zeiss Ikon *Bildfensterlinse* ("picture - aperture lens") which enables the projection lens, even if small in size, to intercept all of the light thrown upon the film aperture by large lamphouse mirrors. The Bildfensterlinse, inserted directly behind the aperture of the Ernemann projector, is made of heat-resistant quartz. It "funnels" the light to the projection lens, upon which it forms a reduced, intensity bright image of the arc-lamp mirror.

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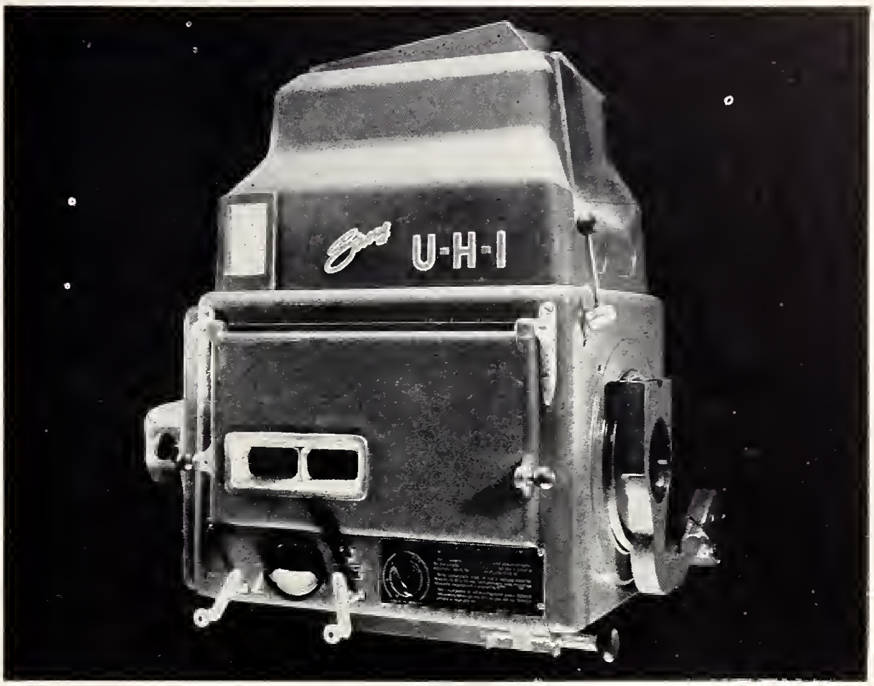


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# New Italian Projector for Widescreen Presentation

**From Italy comes this description of a new projector designed to handle the problems of widescreen viewing, with some design features that may be new to the States.**

By RAFAELLO G. FEDI

EVER SINCE the inception of CinemaScope in the late summer of 1953, motion-picture presentation has increasingly favored aspect ratios greater than the normal 1/1.375 ratio. But good panoramic photography and projection, with brighter, clearer pictures of vast pictorial scope, have encountered numerous technical obstacles during the past five years of gradual, step-by-step introduction to the trade. Rather than discard all existing studio and projection-room equipment, producers have obtained the panoramic aspect ratios by exploiting extant equipments by means of minor adaptations and modifications entailing only small investments on the part of theatre owners.

Two processes are in use which do not require replacement of standard 35-mm camera and projector apparatus. They are (1) "widescreen" shots taken and projected via short-focus lenses with reduced frame height and (2) CinemaScope and SuperScope shots employing anamorphic lenses which "squeeze" the images on the film during photography and expand them again to normal height-width relationship during projection.

### *Design Requirements*

The extra responsibility placed upon projection designers by these new 35-mm processes may be summed up as follows:

1. Higher precision of the mechanical working parts to avoid any small weaving of the film which, on the screen, would result in unsteady pictures because of the tremendous image magnification.

2. More powerful light sources to illuminate the larger screens. Intensity of the screen light should not be below 90 lux (8.3 footcandles)* for a brilliant picture with readily visible pictorial detail in low-level regions.

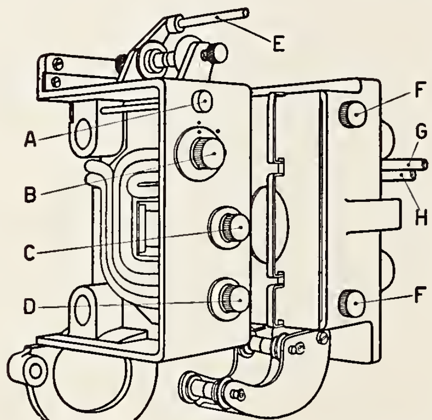



FIG. 1. The Fedi XII T film gate (threading position): A is the gate opening push-button; B, knob for vertical regulation of aperture; C, knob for horizontal regulation of aperture (right); D, knob for horizontal regulation of aperture (left); E, film loop former; F, pressure shoes regulation, and G and H show the water-cooling pipes.

3. Addition of a magnetic soundhead for reproduction of the magnetic tracks used in the Fox CinemaScope stereophonic system.

4. A projector occulting-shutter of maximum light-transmission efficiency (50%) and conjoined with filtering means to remove invisible calorific (infrared) rays from the light output of the projection lamp.

Calorific rays, useless because invisible, are undesirable inasmuch as they do nothing but overheat the film. It has been demonstrated that the temperature developed in a projector aperture attains 550° C. (1022° F.) when an efficient 100-ampere arc is used without heat filters. Exposure of the film to so high a temperature for only 1/32 of a second** buckles the film out of shape.

5. Provision of means which allow the projectionist to change aperture dimensions and lenses, including anamorphic attachments, without the necessity of stopping the machine or re-establishing the focus.

### *Unenclosed Mechanisms*

European designers have always aimed for the production of projectors built for heavy-duty operation and long life. It is a matter of interest to American projectionists that most European machines have unenclosed mechanisms. It has been found through long experience that open mechanisms permit closer control during projection and make the job of cleaning the film-contacting parts much easier.

The present-day practice of using anamorphic and non-anamorphic widescreen films interchangeably, together with changes from optical to magnetic soundtracks, has made mechanism enclosures cumbersome and hindrance to the busy projectionist. It is therefore our considered opinion, supported by that of European projectionists, that mechanism enclosures should not be used.

For as much as great attention is devoted to the mechanical parts of the projector in European practice, particular care is given to lubrication to insure minimum wear and long life of the mechanism. Our machines are accordingly provided with an automatic pump which forces oil under pressure to the various moving parts—particularly to the intermittent movement, which is literally subjected to continuous washing.

The salvaged oil is passed through

* The American *minimum* standard is 9 footcandles. An incident light level of from 15 to 20 footcandles (161.5 to 215.3 lux), approximately twice the European standard, is favored here because the public is accustomed to bright television images in the home.—ED.

** More exactly, each frame remains exposed for two 1/96-second intervals, a total of 1/48 second with a 2-cutoff shutter of 50% transmission.—ED.

special filters and recovered. Adequate lubrication of high-precision mechanics accounts for the long life and noiseless operation of projectors of European manufacture. Many European theatres have only one machine installed in the projection booth; and not a few of these are still making use of projectors that have been in operation for more than ten years.***

The Fedi XII T projector was designed after having reviewed all the motion-picture machines made the world over, and after an intensive examination of rational solutions to all the various problems brought to the forefront by widescreen processes.

### *Parallel-Axis Gears*

The mechanism of the Fedi XII T has as its basis a gear train consisting of parallel-axis gears. The use of orthogonal-axis**** helical gears was avoided as far as possible, inasmuch as their excessive axial thrust facilitates wear and results in consequent noisy operation. Lubrication is effected by means of a high-pressure pump (approx. one-half atmosphere) which, by means of a continuous jet, washes the gears and intermittent movement and forces a film of oil between the bushings and their respective shafts.

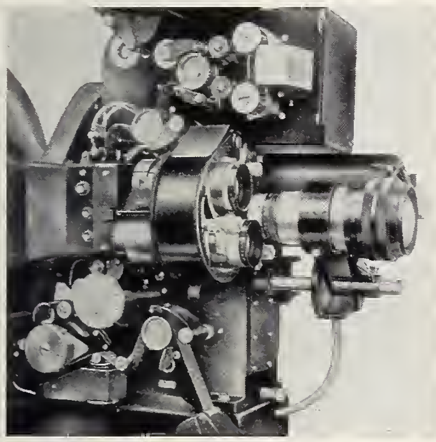


**FIG. 2. The FEDI XII T sound-projector mechanism with 3-lens turret and anamorphic lens mounted on a rod which permits it to be swung into position. The cover has been removed from the magnetic soundhead to reveal the film path.**

The motor, which has a speed of 1440 RPM when connected to a 50-cycle line, is directly coupled to the shutter shaft, i.e. to the *mechanical center* of the mechanism, insuring uniform distribution of the driving torque to the moving parts above and below this center. Where currents other than 50 cycles are involved, a small reduction-gear unit is used between the motor and the projector shaft to obtain the required driving speed.

### *Center Drive*

It will be perceived that this type of drive is much more rational when compared with the old system having the drive originate from the axis of the lower sprocket. All the impulse needed to start the machine was concentrated at the gripping point of the first driving gear. By placing the drive at the center, we have two "derived lines" of torsional stress; and if these two lines are alike, the pressure developed at the gripping point of the drive-gear teeth amounts to one-half the torque developed in the case of the older "one-end" drive.

The film gate has been dimensioned to obtain the long guided film path necessary to avoid sidesway, and a set of three hinged pressure shoes was adopted in the trap door to obtain sufficient total pressure to obviate film jump with only slight individual-unit pressure. This construction insures a rocksteady picture both laterally and longitudinally.

An especially valuable innovation is the adjustable film-gate aperture with four movable sides to obtain any size of aperture desired without the necessity of changing aperture plates (Fig. 1). The light-cutting edges are positioned very close to the film to obtain a sharp aperture image. Accurate adjustment of aperture size is particularly important to avoid shadows at the boundaries of the picture when projecting upon maskless screens, an innovation intended to eliminate funereal black borders. The Fedi system allows the projectionist to alter the size of the aperture with great rapidity even while the film is running (Fig. 2).

### *Three-Lens Turret*

The Fedi XII T projector is provided with a special rotating turret carrying three lenses, each focused independently of the others (Fig. 3). A simple turn of the turret will cause any one of the three lenses to fall in place before the aperture. By installing lenses of different focal lengths, the picture size can be changed even while the machine is running. A special rotating rod supports the anamorphic lens which is brought before the projection objective or swung out of the light beam by a simple movement.

Cooling of the film received particular attention. First of all, water is circulated through a radiator attached to the aperture-plate assembly for removing the heat generated by light falling outside the aperture. While this expedient keeps the mechanical parts cool. other means are employed for cooling the film, each individual frame of which remains steadily exposed to the light for a 1/32-second interval. [See the previous footnote dealing with this.—ED.] Neither a fan nor a cooled air blast would serve the purpose because the film, being a poor conductor of heat, would not immediately cool under the air blast. Other complications to be considered include elimination of the noise of the blowers and the difficulty of obtaining strong blasts of air which have been made to pass through a filtering arrangement to remove dust, oil, and other foreign matter which would soil the film.

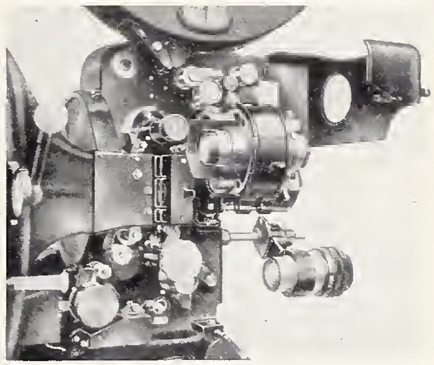


**FIG. 3. The FEDI mechanism "opened up" for threading. The lens-carrying turret is swung out of the way, as is also the anamorphic attachment. Note the set of three separate tension pads in the gate door.**

### *Removing Infrared Rays*

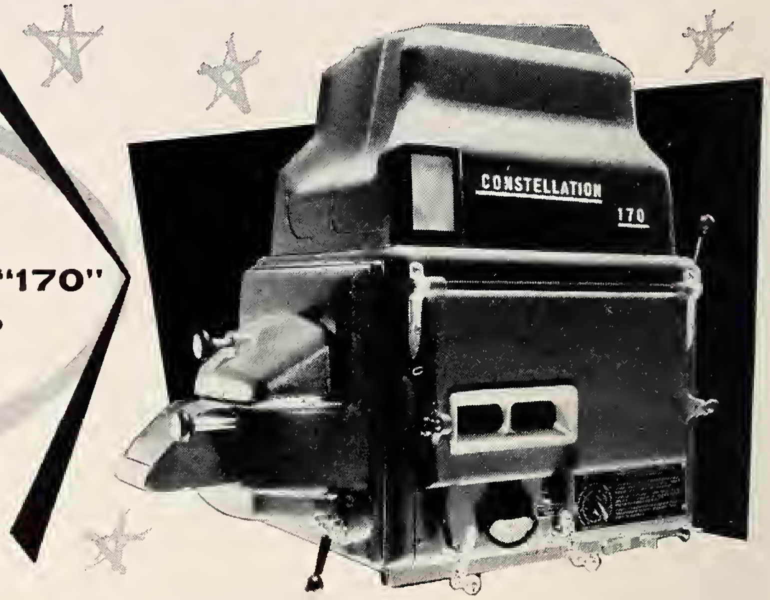
A more practical and scientifically feasible method involves the removal of calorific (infrared) rays from the luminous flux. This is accomplished in the Fedi by mounting the heat filters in the open sectors of the revolving

(*Continued on page* 38)

*** It is customary, with only one projector in a European projection room, to make use of 1500-meter magazines. The use of reels containing up to 5000 feet of film is unknown to American projectionists except for 2-strip 3-D presentations. All American theatres have at least two machines; and some installations are still giving excellent service after a quarter century, with picture mechanisms more than 30 years old!—ED.

**** An orthogonal axis is oriented at a right angle to the general axial direction of the other shafts of a mechanical system, as in the case of a vertically-positioned main drive shaft fitted with bevel gears to drive horizontal shafts.—ED.

# AT LAST! A PROJECTION ARC LAMP...




## The New NATIONAL CONSTELLATION "170" PROJECTION ARC LAMP

**PATRONS** will like this because your pictures will be brighter!

The Light Booster lens provided with 13.6 mm trim lamps patterns the spot to the size and shape of the aperture so as to efficiently utilize all useful light from the carbon. All other lamps, projecting a round spot, waste much light, particularly above and below the aperture. Using a 13.6 mm carbon trim, the optical speed or mark of efficiency is equivalent to f 1.5 when f 1.5/1.6 projection lenses and X-L projectors are used.

**PATRONS** will like this because the entire picture will be more evenly lighted.

Newly designed optical parts and feed mechanism afford a higher true lumen output than any other lamp and better distribution consistent with this high level of illumination.

**PATRONS** will like this because your pictures will stay in focus.

Since the distribution of heat at the aperture is more even and the use of a very efficient heat filter reduces heat at the aperture, pictures projected by this lamp are not subject to the high degree of in-and-out of focus that distinguishes projection by some lamps operated at high currents. This filter, air cooled by a powerful blower, is instantly removable during actual projection as desired, such as when going from black and white to color film on the same reel.

**PROJECTIONISTS** like this because they can keep their equipment in better condition.

The rear lamphouse door swings completely out of the way to facilitate retrimming and lamphouse and reflector cleaning.

**PROJECTIONISTS** like this because good projection becomes more automatic.

The automatic crater positioning system maintains the tip of the burning carbon at the exact focal point of the reflector. Change of light color at the screen, caused by variation in carbon burning rates, is absolutely eliminated.

**PROJECTIONISTS** like this because it saves important time when needed.

The optical system can be changed in one-fifth the time required by other lamps. Choice of high or low magnification is obtained for wide film or 35 mm projection in less than a minute.

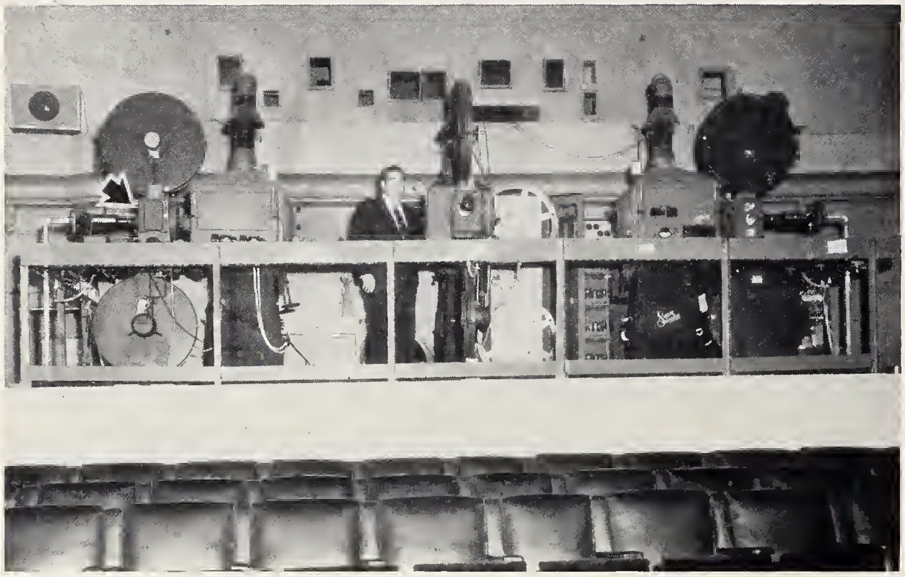
**PROJECTIONISTS** like this because it makes the booth and equipment more tolerable.

Heat radiation to the projection booth is held to an absolute minimum by the Heat Purger, a heavy duty, quiet running centrifugal exhaust fan driven by a permanently lubricated motor which removes products of combustion and heat from the housing.

**PROJECTIONISTS** like this because it takes the guesswork out of their job.

A single adjustment controls the feeds of both carbons. Other lamps have at least two independent feed adjustments and guesswork must be resorted to when attempting to match them.

**A new wide-screen process covering 146° of the horizon makes its debut, utilizing three interlocked projectors.**



Cinemiracle projector setup is similar to that for cameras. Machine in center projects straight on while machines at either side, set at right angles, project picture on angular mirrors (arrows), which reflect images to screen for left- and right-hand panels of the wide-screen picture.

# Cinemiracle Process Bows In†

## By JOSEPH HENRY

CINEMIRACLE is the newest of wide-screen motion picture systems that have been developed in recent years to meet the exhibitor's need for a "new look" in film presentations. Reduced to simple terms, Cinemiracle employs a three-cameras-in-one photographic unit, and three projectors interlocked in a single projection booth. Each projector covers one-third of the huge screen area, with three panels (picture segments) smoothly vignetted at the margins to create one elongated picture that covers a full 146° of the horizon.

### No Demarcation Lines

Nearest thing to Cinemiracle is Cinerama, which preceded it. Unlike Cinerama, only one projection room instead of three is required, and the blending of the lines of demarcation between the picture segments is pretty near perfect, so that you see a single super-wide picture on a large, slightly curved screen. Jiggle between the three picture segments is non-existent. At least it was in the demonstration screenings held in Hollywood last month.

As early as 1952, National Theatres commenced development of this new process, when it placed the company's chief engineer, R. H. McCullough, in charge of a research program aimed at creating an entirely new principle of camera and projection technique.

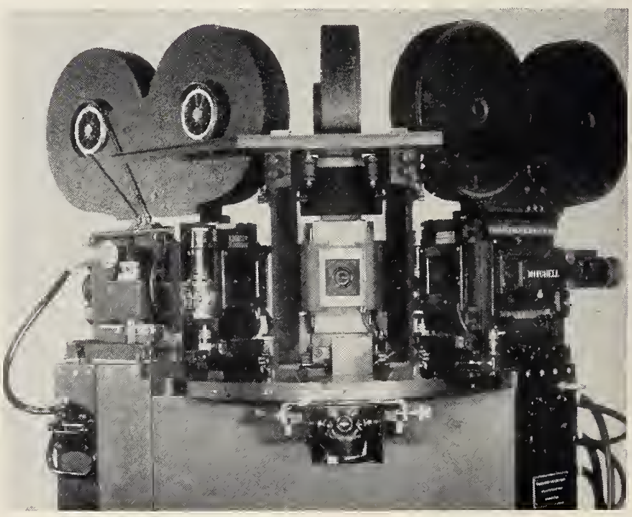
Shortly after he became president of National Theatres in November, 1954, Mr. Elmer C. Rhoden stepped-up and expanded the research program, not only on the projection phase, but also in the development of a multi-panel, three-lensed camera.

Within a few months' time, National Theatres acquired world wide exclusive rights to the Smith-Dietrich patents covering a new electronic lens system developed by the Smith-Dietrich Corporation. The combined projection and camera systems were then named "Cinemiracle." Orders were placed for two camera units with the Mitchell Camera Company. The cameras were equipped with the electronic control systems developed by National Theatres, and the Smith-Dietrich lens systems.

### No Joining Lines

The Cinemiracle engineers have achieved further perfection of picture quality through the use of mirrors, both on the camera unit and in projection. Electronic lenses on the three recording units of the Cinemiracle camera, mounted as a single mobile unit and meshing as one, are so synchronized and perfectly adjusted that each scene is photographed on three individual strips of 35-mm film and partially blended at the margins to eliminate the line of demarcation. Further vignetting in the printing completes the blending, so that the picture appears on the screen without joining lines at any point.

But more important, because of the unique system of shooting with mirrors, there is no bending of horizontal or angular lines at the panel margins, as with other three-film systems. The center camera records the center picture panel directly through the lens of the camera. The two side cameras, each set at an angle, photograph the left and right hand sides of the scene which




The Cinemiracle camera—actually three cameras in one. Built by Mitchell Camera Corp., center camera records the middle segment of the picture. Vertical mirrors at either side of center camera lens pick up the left- and right-hand sections of the picture, which are recorded by the left- and right-hand cameras.

† From *American Cinematographer*, Feb. 1957.

are reflected in the mirrors.

The camera lenses provide a depth of field from 3 feet to infinity at the average working aperture. Some exceptional underwater shots made with the camera, using Eastman Color negative exposed at $f$:2.8, were screened during the recent Hollywood demonstration. But it was the edge-to-edge sharpness that marked all types of shots made with this camera that was impressive. Whether it was their aim or not, Cinemiracle's engineers have finally evolved a three-film wide-screen process that is admirably suited to the photography

Clip of Cinemiracle film, showing 6-sprocket picture area. Three films such as this are required to produce the widescreen Cinemiracle picture. Arrow points to edge which receives special vignetting in the photography and printing.

of dramatic stories in addition to the travel and trick stuff which marks the usual three-film presentations.

As with any three-camera filming system the consumption of film for any type of production is high. In addition to the three cameras, each requiring a separate load of film, the film travels through each camera, which has a six-sprocket pulldown, at the rate of 146 feet per minute.

For panning and tilting, the three-camera unit has been carefully balanced so that it may be used on almost any of the conventional heavy-duty tripod heads or mobile camera mounts. Because of the interlocked electronic control of the lenses, follow focus shots are simple to make, the three individual lenses responding to the remote control with infinite accuracy.

### Single-Booth Projection

Just as the three Cinemiracle cameras for the photographic process are mounted on a single standard as an integrated filming unit, the three projectors necessary for showing the films are housed in a single booth. As with the cameras, the center projector screens the center panel of the three-section picture. The left- and right-hand panels are projected with the machines set at right angles to the center projector and project the image into adjustable angular mirrors. The fine micrometer adjustment on these mirrors is an important factor in achieving the fine blend of margins of the three projected images so that they join smoothly into one large wide-screen picture.

All three projectors are equipped with giant 8,000-foot reels and, as in the cameras, the film travels at the rate of 146 feet per minute. The sound track is on a separate magnetic film and is played in sync with the picture on equipment interlocked with the projectors. To eliminate keystoning, the projectors are so mounted that they project the images on a straight line toward the screen.

The slightly curved Cinemiracle screen (the 26-ft. by 63-ft. demonstration screen had a maximum curve of 13 feet at the center) covers a field 146 degrees wide and 55 degrees high—approximately that of human vision of 160-60 degrees. The picture can be viewed comfortably from every angle without eye-strain.

That old time-worn bromide, "It's done with mirrors," takes on new meaning today with the advent of one of the most interesting new wide-screen developments.

## Trade Show Pact Signed

Theatre Equipment and Supply Manufacturers Association, National Association of Concessionaires, and Theatre Owners of America have signed a three-way contract to stage the Motion Picture Industry 2nd International Trade Show at Miami Beach, Florida, November 20-23. The pact was finalized after many weeks of negotiations and disagreements. The trade show is expected to surpass in scope and size the one staged last year at the Coliseum in New York. TOA officials indicate that registrations for this year's show will surpass in numbers any recorded to date.

NAC plans educational clinics to outline the latest experiences of all types of concessions operations in theatres, and allied fields. Question and answer forums will be a feature.

TESMA will meet with Theatre Equipment Dealers Association a few days before the trade show to allow the manufacturers and dealers to attain closer relationship than has been possible in the past, due to the time necessary to prepare the show.

Site of the show will be the new $17 million Hotel Americana in Miami Beach.

## SMPTE Forms Canadian Section

The Board of Governors of SMPTE has authorized a Canadian section of that society with headquarters in Toronto. The move was brought about by a petition received from a sizable group of Canadian SMPTE members. The organization will include all 180 SMPTE members in Canada, and as soon as arrangements are made, the section will hold its first technical meeting.

# TELECASTS

## Cable Theatre-TV System Set for May

THE FIRST of May is the scheduled date for the inauguration of the world's first Tele-Movies cable theatre in Bartlesville, Oklahoma. The system, developed by Jerrold Electronics Mfg. Corp. of Philadelphia, provides that a picture originating in a theatre is sent by means of cable simultaneously to subscribers' home TV sets. The Oklahoma experiment is to test subscriber and connection rates, and the general consumer pattern.

Originating from regular 35-mm motion picture film, the image is sent out on special sending equipment, then on a coaxial cable strung on telephone and light poles. The picture reaches the home TV set by a lead-in from the cable, connected to an off channel that is not being used by a regular TV station. An aerial is not required for this system.

Installation of equipment and materials begins this month, and negotiations between Tele-Movies, Public Service Co. of Oklahoma, and Southwestern Bell Telephone Co. on lease contracts for pole usage are in their final stages. Plans are also being made for erection of a new building on the site of the present theatre to house the new system.

An intensive advertising campaign has been instituted to acquaint the public with the new system. According to Jerrold, security is guaranteed the subscriber (who pays $9.50 a month for the service), security because the picture is available only to those homes with the lead-in. No service charge is expected for connecting or disconnecting the system to the resident's TV set. Equipment can be modified for color movies whenever the number of color TV sets warrant it.

Tele-Movies will begin showing at noon each day, and continue until midnight. If there is public demand, a late show will be played on Saturday nights. There will be three program changes a week, consisting of feature films and short subjects. No commercial advertising will be on the program.

## GPL's TV Classes

A COURSE in the familiarization of General Precision Laboratory's new screen projection TV system has been established by that firm in its Pleasantville, N.Y. headquarters. Over 40 representatives of TelePrompTer and Western Union Telegraph Co. have already taken a three-day introductory session.

The training program is designed to give purchasers an acquaintance with the operation, application and maintenance of the PB-611A TV projector, together with a familiarization of new equipment. The portable 611A models are said to produce a high quality televised picture up to 15 by 20 feet in size in sharp brightness.

The visiting group was headed by H. J. Schlafly, executive vice-president in charge of Engineering at TelePrompTer. That firm has purchased 100 of the advanced GPL projection systems for its Group Communications Division, which will operate them nationally for all types of closed-circuit TV sessions.

## Videotape Improvements

SIX REFINEMENTS will be incorporated in the Videotape recorder, Ampex Corporation's magnetic TV program recorder. The improvements are the result of network use of the prototype machines by both NBC and CBS. Ampex engineers have been working closely with NBC and CBS engineering personnel since last April.

Cuing facilities, switching devices, synchronization with other studio apparatus, tape interchangeability among recorders, tape splicing, and ease in making duplicate copies of taped programs will be the improvements made in the Ampex VR-1000 Videotape.

Six of the prototype recorder models have been installed for work under actual programming conditions: four in Hollywood and two in New York. One of the Videotape models was used in the rebroadcast of President Eisenhower's inauguration. (See *Telecasts*, IP, February 1957.) Ampex is now concentrating on tooling for the production model, for which there is a $4,000,000 backlog of orders.

Philip L. Gundy. vice-president of Ampex predicts Videotape's future will evolve in three steps: (1) strictly delayed broadcasts; (2) the pre-recording of shows; and, (3) with editing, the syndication and multiple release of programs for TV.

### Are You Moving?

If so, please notify us one month in advance. Thc Post Office does not forward magazines. To avoid delay, please cooperate by sending us both your *new* and *old* address.

## "Unsqueezing" Problem

A PROBLEM that the arrival of Tele-Movies has brought up is now being considered by 20th-Fox, and that is the feasibility of adapting CinemaScope to that medium. Video Theatres, owners of the process, have already queried 20th-Fox on the question.

In order to turn CinemaScope into a regular 2-D image, an "unsqueezing" process must be worked out, not a simple procedure. A duplicate negative must be made, on which the action on every frame has to be centered with an optical printer. The process is expensive and time-consuming, although it is understood that no loss of quality is involved.

Anticipating future sales of CinemaScope to TV, 20th-Fox has been considering unsqueezing all its CinemaScope features. Some companies who made cover versions of their CinemaScope product do not face this problem.

**Our overseas expert on projection and accompanying product herewith presents what is the latest from the foggy Isles.**

# From the British Viewpoint

By R. HOWARD CRICKS

TO BEGIN WITH, it is with a feeling of some pride that I can contribute to IP's pages, since I think I can claim to have seen practically every issue since its early days.

What an exciting period was covered by those early numbers! News was just arriving from across the Atlantic of the phenomenal interest in talking pictures, and before long Western Electric and RCA were over here, competing with innumerable systems of British and Continental origin. Every month for years I was able to write up a new system in the IK, and once there were 16 competing manufacturers advertising in one issue.

It is generally known that sound-on-film was first invented in London by Eugene Lauste; the British patent No. 18,057 is dated 1906. [Ed. Note: While Lauste's Photocinematophone system is generally accepted as the forerunner of today's optical sound, it was the outcome of even earlier developments. For a more detailed discussion of this see the "Pioneer Parallels" article in last month's IP.] But the contribution of a leading American inventor should not go unnoticed.

Lee De Forest—who by putting the third electrode into the diode invented the amplifier—was making talking pictures in England quite early. It was in 1925 that he gave his first public performances, using variable-density recordings differing from present-day systems chiefly in that the soundhead was above, instead of below, the picture gate.

## EARLY BRITISH DEVELOPMENTS

Before American talkies reached this country, British Acoustic Films had demonstrated sound-on-film reproduction, using a variable area track extending the full width of a separate sound film, run in sync with the picture film.

To record these facts is not to deny that it was American equipment which set the pace, and it was American films, from "The Singing Fool" onwards, that brought in the patrons. Although I had run a number of shorts, the first full-length sound film that I showed was "Broadway Melody," with its sound on 16-inch discs.

American sound equipment has been built around the Simplex-type projector, and one of the first results of the talkie boom was that nearly every cinema in London's West End, and many in Provincial centers, installed Simplex projectors. The pre-eminence of the Simplex remained unchallenged until in war-time conditions dollar purchases were prohibited—a ban that is still not relaxed.

The former Simplex agents, J. Frank Brockliss Ltd., are today agents for the Dutch-made Philips projectors, which are gradually becoming popular—in particular, both the 35-mm and 16-mm models are used almost exclusively by the commercial television stations for film projection and telecine (kinescoping).

## G.B.-KALEE MODELS

However, the majority of our cinemas are equipped with one or other of the three principal British-made projectors. The G.B.-Kalee (G.B. for Gaumont-British) is made by two pioneer companies who are members of Rank Precision Industries—Kershaw of Leeds, and British Acoustic Films. It is made in three models, of which the largest, the G.K. 21, is a massively built machine with a single-bladed shutter running at double speed, which gives an extra fraction of light output.

While Gaumont theatres are mostly equipped with G.B.-Kalee projectors, Odeons (also part of the Rank Organization) are generally equipped with the SUPA, made by British Thomson-Houston of Rugby. This is a machine of unorthodox design, originally conceived as a totally self-contained unit, but the coming of 4-way sound rather upset this idea. Two attractive features are its curved gate, which prevents film buckle, and its eddy-current governor controlling film speed in the soundhead. The junior model, the SUPA Mark II, is of more orthodox appearance.

The principal competitors of the Rank theatres are those of Associated British Cinemas Ltd., most of which are fitted with Ross projectors. Made by the world-famous optical firm, the machine is noted for its long trouble-free life.

## TODD-AO IN ENGLAND

In my report on Photokina in the November IP issue, I remarked that it seemed we should not be seeing Todd-AO in this country, because of the crippling levels of entertainment tax. It seems that about the time this article appeared, representatives of the Rank Organization were in the States, saw "Around the World in 80 Days," and decided that it must be shown in London in its original form.

After many rumors and denials, it is expected that Todd-AO projectors will be installed in the Astoria Theatre here, which has the advantages of a

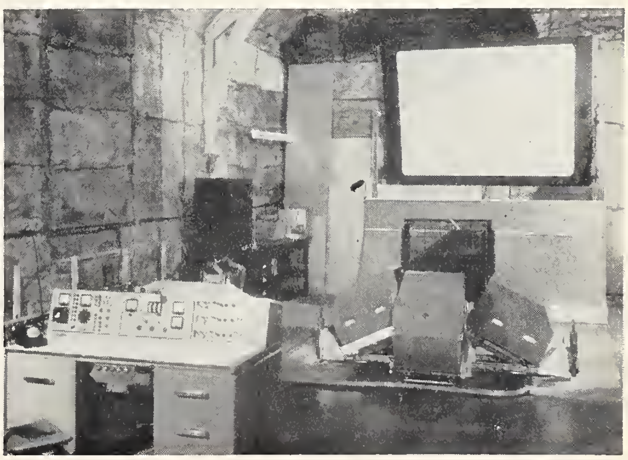


FIGURE 1.
A simultaneous color TV projector developed by Pye, Ltd. This equipment was primarily built as a research tool with which to investigate some of the basic problems of large screen color TV. The picture size is 8 feet by 6 feet.

level throw and adequate seating capacity.

The need for a level throw is, of course, due to the deeply curved screen which is part of the system. In the early days of CinemaScope, patrons found cause for amusement in the spectacle of skycrapers leaning toward one another, and ships climbing up a curved sea. The fault will not be repeated with the new system.

I hope the question of the screen will receive closer attention here than was the case at Cologne, where its deep curvature plus a white ceiling caused re-reflection of the light and some washing out of colors.

### NEW PERLUX SCREEN

It is understood that the screen that will be installed at the Astoria is the Harkness Perlux, a new development. To look at, the material is little different from the ordinary matte screen, except for a slight pearly iridescence. Demonstrated here, its efficiency was impressive.

The Perlux coating consists of two metallic salts, which in the bottle have a silvery gleam, suspended in plastic. The new screen is made, in all sizes and large quantities, in a former film studio at Elstree, just outside London. The equipment is specially built, the only one of its type in the world, therefore worth describing.

First, the strips of plastic material are perforated, and are invisibly welded together to the necessary size. Edges and eyelets are attached, and then the screen is stretched in an immense frame. While this frame travels slowly on rails across the studio floor, a spray gun moves up and down, painting the screen in vertical strips: in four traversals of the frame, every part of the screen receives 16 coats of the special surface.

After drying, the screen is examined by throwing a light upon it from an arc high up on the opposite wall.

### COLOR TV PROJECTOR

Although regular transmissions are now being put out after hours by the British Broadcasting Corporation, color TV is still in its experimental stage in England, and color receivers are not yet on general sale.

Which makes it all the more interesting to learn that a British company, Pye Research Laboratories has produced a large-screen color TV projector (Fig. 1). It employs the principle of three separate color projectors, providing respectively the red, green, and blue components. By means of a half-silvered mirror and a dichroic mirror (which reflects light of one color and transmits light of another color) the three images are superimposed on the screen.

At a throw of 16 feet, this projector produces an 8 x 6 foot picture, of brightness comparable with that of a cinema picture. Kodachrome transparencies of the projected picture showed an excellent color range and very good definition.

The fourth housing shown in the illustration is the EHT unit, providing 50 KV. The equipment is controlled from a console which may be placed at some distance from the projector.

There is a new type of television set which is under development at the Imperial College of Science in London. Instead of the familiar shape of the CRT, it looks (or will look) just like a picture hanging on the wall. A 12-inch screen will have a depth of only 3½ inches, and a 21-inch screen only 4½ inches.

The electron gun at the top of the screen sends the electron beam downwards to the bottom of the screen, where it is reflected upwards, and by some piece of electronic magic each electron is made to hit its appropriate point on the screen. I should emphasize that the system is only in the experimental stage.



## Equipment News from Allied Drive-in Conclave

If conventions are barometers, then the recent Fourth Annual National Allied Drive-In Theatres conclave in Cincinnati would indicate that drive-ins are going into an even bigger expansion than last year, when about 250 ozoners were built. The reasons for this seem to be four-fold: (1) we are a nation on wheels; (2) especially in the summer do we like to dress easy; (3) no need for a baby-sitter, and (4) amusements and concessions—it is no idle jest that drive-in operators have developed into restaurateurs and amusement park men.

But amusements and concessions are only component parts of drive-in operation, and what was of most interest to technicians at the Allied convention were the new advances in equipment.

Prominent among the new equipment at the show was the Strong U-H-I arc lamp. The Strong lamp is a completely new apparatus that includes an exclusive feature of focusing the light to fit the aperture. (This was described in more detail in February's IP.)

### *Small Sprockets Due*

Standardization of small sprockets was another topic of great interest at the convention. With both MGM and 20th-Fox adopting the small-sprocket Magoptical print, it looks fairly certain that other companies producing in CinemaScope will follow suit. But to date, out of 17,591 theatres only 15% have installed small sprockets. Hugh McLachlan, chairman of the Allied equipment committee, warned exhibitors at the convention that they were liable to get caught in the rush when the small sprockets became required equipment.

The exhibitors and equipment manufacturers at the convention voiced the opinion that the future of large film, either 65-mm or 55, rests largely with the drive-in theatres. The consensus of opinion was that large film had the greatest potential

value for the drive-ins.

But Hollywood producers and equipment manufacturers are said to require some assurance that from 4,000 to 5,000 theatres would go along with large film before equipment manufacturers would set up provisions for large scale manufacture, or before Hollywood would consider general release.

The new Bausch & Lomb "cold" reflectors came in for some praise from the delegates. Under impartial observation, at 150 amperes there was a 50% reduction in heat, no film damage, and no filters. It was warned, however, projectionists should be sure that their lamps can carry off the heat passed to the rear of the lamphouse.

The recently introduced National Theatre Supply Constellation 170 arc lamp. The new lamp features many exclusives, among them a special lens to pattern the spot to the aperture, an automatic crater positioning system, and spot focusing available with the entire burner assembly being movable.

Along with wide-gauge film, stereophonic sound was considered to be a valuable aid to a prosperous drive-in future. At this time there are only 3,662 theatres equipped to reproduce stereophonic sound.

The Allied equipment standardization committee will meet with 20th-Fox to discuss means of making wide-gauge film available in the most efficient and least expensive way. Delegates were urged to write in to their state Allied associations and indicate whether they were willing to convert to wide-gauge. From the response, producing companies could make some estimate of interest in big film.

Of non-technical nature, but of interest to drive-in technicians was the softening of the exhibitor organization's policy toward distribution. The newly-elected Allied president, Julius Gordon, has indicated a conciliatory policy toward ending internal industry conflict.

## 20th-Fox Adopts Small-Sprocket Magoptical

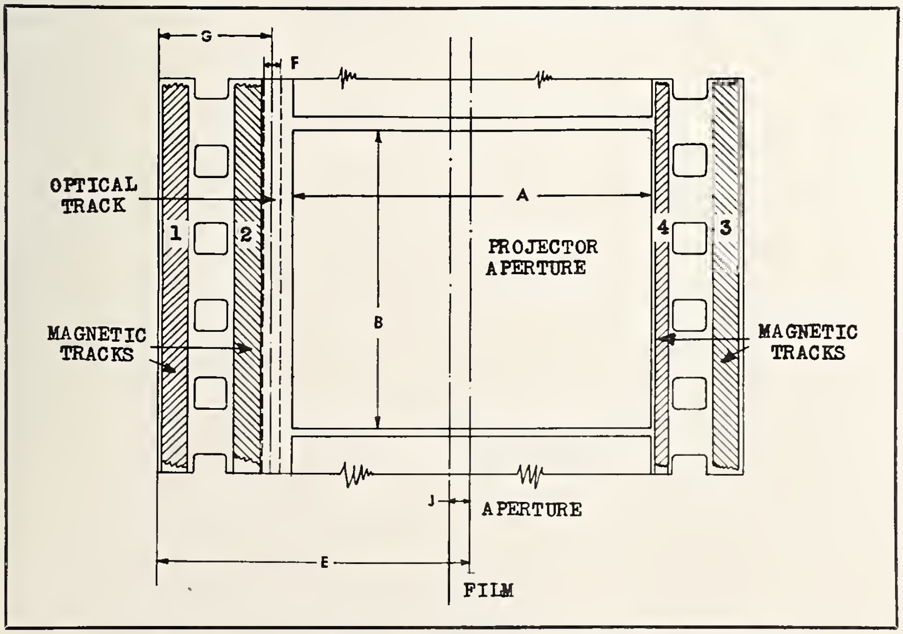
Twentieth Century-Fox has announced that, effective with its current release, "The True Story of Jesse James," all its CinemaScope prints will be the small-sprocket Magoptical developed by the Motion Picture Research Council. Exhibitors are being cautioned that small-tooth sprockets are essential projection equipment for any theatre showing Fox CinemaScope prints. Heretofore, two types of CinemaScope prints were issued: magnetic with small perforations, and optical with larger perforations. It is expected that other companies producing CinemaScope will follow in Fox's steps. MGM has had the Magoptical print in use for a year.

Magoptical sound consists of the regular four-track magnetic sound used in the CinemaScope process, plus an optical sound track having half the width of the normal optical track. The prints can play either:

(a) Four-track magnetic stereophonic, requiring magnetic soundheads, four pre-amplifiers, four main amplifiers, three stage speakers and surround speakers.

(b) Optical, requiring an optical soundhead, one pre-amplifier, one main amplifier, and one stage speaker.

(c) Optical sound-directional, requiring an optical soundhead, one integrator, three pre-amplifiers, three main amplifiers, and three stage speakers.



Motion Picture Research Council's official diagram of the magoptical print.

The projector aperture is identical to that used with CinemaScope optical sound. Dimensions, as shown in the diagram, are:

| Dimensions | Inches |
|---|---|
| A | 0.839″ Max. |
| B | 0.715″ Max. |
| E | 0.738″ ±0.002″ |
| F | 0.038″ Max. |
| G | 0.262″ ±0.002″ |
| J | 0.049″ |

The natural advantage of the Magoptical print is that it represents considerable savings in distribution and speeds booking, since no matter what sound system a theatre may have, the same print will be available to all. Cost of converting two projectors and soundheads, based on parts and labor, range from about $90 to $160, dependent on make and equipment.

From certain quarters of the industry there have come some objections to the print, because it was considered that since the optical track is narrower than normal, there would be a reduction in theatre sound reproduction. This problem is said to have been reduced through continued development. All studies belonging to the Motion Picture Research Council have aided in Magoptical development.

### Radiant's 41 Distributors

The complete line of projection screens of Radiant Manufacturing Corporation is now being carried in 41 distributor warehouses throughout the country. Four new locations have been established, in addition to which the Chicago firm has expanded service facilities in Hawaii and Canada.

### Increase Tint Footage

Criterion Film Laboratories, Inc., seven months in operation, has found it necessary to increase its color facilities by 50%. Originally engaged mainly in 16-mm work, the New York firm has now installed new equipment to insure rapid delivery of 35-mm black-and-white rushes.

**The present optical vs. magnetic reproduction controversy invokes still another correspondent to voice his opinion.**

# A Defense of Magnetic Reproduction

By DR. JOHN G. FRAYNE

Engineering Manager, Westrex Corp., Hollywood

YOUR ARTICLE "Is Magnetic Reproduction Worthwhile," with Mr. Robert Mitchell's reply in the January issue of your valuable journal has interested me very much. I do not wish to challenge the general conclusions at which he arrives, since the subject under discussion is highly controversial, and there are many arguments on both sides of the question.

Let me deal first with some of the statements relative to optical tracks. The author states, for example, that "high frequency noise and distortion . . . seems to be largely dependent upon the method of recording used, the variable density method suffering the most." The matter of relative noise levels of variable density and variable area tracks is debatable, and I agree that on a new, carefully processed print, noise from a variable area track is considerably (6 db) lower than on a comparable variable density print. With repeated runnings, the variable area track becomes successively noisier due to accumulation of dirt and scratches on the clear areas of the variable area track. The variable density track with an average density of 0.5—0.7 is not nearly so susceptible to this type of deterioration.

The second statement that variable density suffers most from high frequency distortion is completely at variance with both theory and practice. In modern variable density and variable area recording systems, and with good laboratory control, excellent sound tracks can be produced with either system. The variable area track has the advantage of a somewhat higher volume level and a slight edge in signal-to-noise ratio.

### *Harmonic Distortion*

However, in the reproducing system the variable area track is subjected to severe harmonic distortion from two soundhead defects, whereas the variable density system is unaffected. I refer to the effects of non-uniform scanning slit illumination and of azimuth deviation.

It is shown in numerous articles in technical literature that uneven illumination and/or azimuthal error will introduce harmonic distortion in variable area tracks, the effects being greatest at the high frequencies. On the other hand, the only effect of azimuthal error on variable density is attenuation of output at the high frequencies. Both of these effects on variable area are reduced by reducing the slope of the wave-form; hence, the recent adoption of two double bilateral tracks which are preferable to a single bilateral of amplitude equal to the two component tracks.

> **Referee's Note**
>
> At this point, since there have been so many adherents to both sides of the optical-magnetic debate in the pages of this magazine, IP feels that the most impartial introduction to this article is to quote Dr. Frayne:
>
> ". . . I have greatly enjoyed reading over the years the various articles by Mr. Mitchell in your valuable journal, and I trust that these comments will not be considered as a criticism of Mr. Mitchell, but rather an honest attempt to clear the air on the important subject of magnetic recording, and put the public discussion of this very important field on a solid foundation."

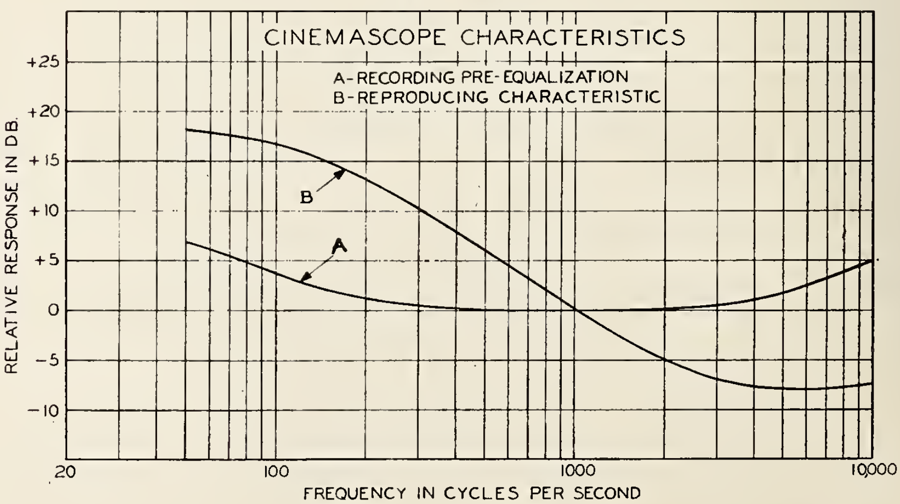
Now we come to the author's comments on CinemaScope magnetic track. He states that the latter is "extremely irregular when uncompensated by the recording amplifier." He then shows a curve (B of Fig. 3, IP, Jan. 57, p. 28) which is claimed to be the recording characteristic of the magnetic stripe. In actual fact, the recording characteristic for CinemaScope is essentially flat except for a boost of about 7 db at 50 cycles and about 2 to 4 db at 8000 cycles, and neither of these are dictated by the recording process.

The pre-emphasis at the low end is compensated by the complementary post-emphasis in the pre-amplifier in the reproducer, and its *only* purpose is to reduce 60 or 50 cycle hum on reproduction. In studio production recording, a flat low end is generally used in recording. The slight amount of pre-emphasis at the high frequency end is put there to offset magnetic gap scanning losses in reproduction and to insure an *overall* flat response to 8 k.c.

### *CinemaScope Characteristics*

A typical CinemaScope recording characteristic is shown in Fig. 1. A typical CinemaScope reproducing curve is shown in the same figure. The

FIGURE 1



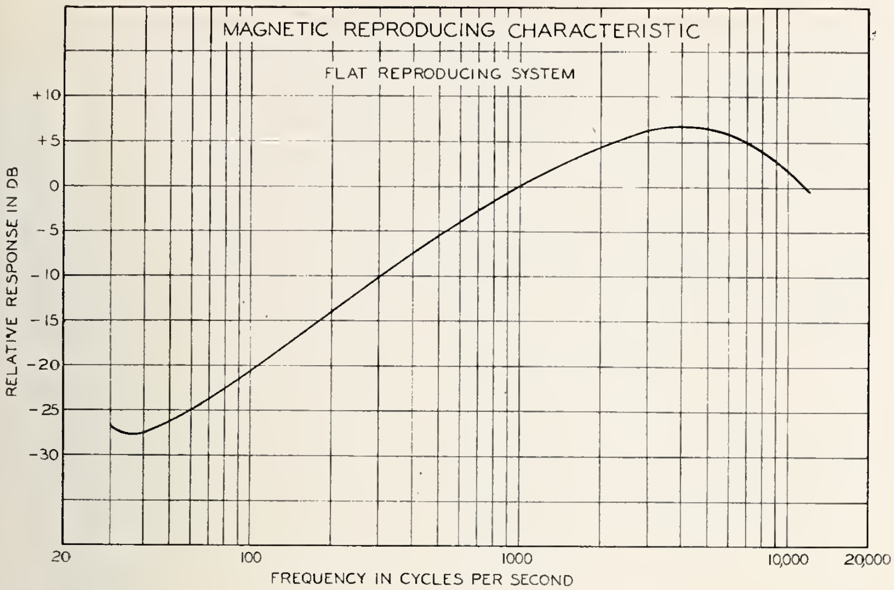



**FIGURE 2**

peculiar shape of this curve is not, as Mr. Mitchell says, to compensate for the magnetic *recording* characteristic but for the magnetic *reproducing* characteristic. This is best explained by reference to Fig. 2. Here is a playback over a *flat* reproducing system of a magnetic frequency film recorded flat into the magnetic head. Ignoring the "bumps" at the external low end, the curve rises with a slope of 6 db per octave from about 60 cycles to 2 k.c. It then flattens out and finally drops as shown in the figure. The 6 db per octave rise is inherent in the method of scanning magnetic tracks. The emf (voltage) generated in the coils surrounding the head core is proportional to the *rate* of cutting of the magnetic flux recorded on the film, *not* to the flux itself.

Now since the elementary magnets in the track become shorter inversely with the frequency the rate of cutting the lines of flux increases directly with the frequency. Thus, a 2 k.c. tone will produce twice as much voltage as a 1 k.c. tone, or as engineers say: "It increases 6 db per octave." Now why does the reproduce characteristic flatten out and finally decline?

First, there are the well-known scanning losses exactly analogous to those met in optical scanning, except the magnetic slit (gap) is not so well defined. Then there is self-demagnetization within the tape which increases progressively as the elementary magnets become shorter and shorter with increasing frequency. The bumps at the low end are caused by the presence of shields and/or coil forms which set up alternate magnetic flux paths which do not thread the pick-up coils.

### *Reproducing Equation*

The reproducing characteristic described above is elegantly described by the equation:*

$$e = K \quad \overset{1}{f} \quad \overset{2}{e^{-t/\lambda}} \quad \overset{3}{\frac{\sin\,(\pi f/f_o)}{\pi f/f_o}}$$

where K = a constant
t = the demagnetization constant of the medium
$\lambda$ = the physical wavelength of the recorded signal
f = frequency of the signal
$f_o$ = cut-off frequency
region 1 of the above equation accounts for the 6 db/octave slope
2 accounts for the demagnetization losses
3 accounts for scanning losses

As I stated in the beginning, I do not wish to argue with Mr. Mitchell's conclusions. However, I do wish to emphasize that if these conclusions were arrived at on the basis of false presumptions of the physical process, then they should be suspected as being colored by the injection of incorrect hypothesis. If they are based on observations over an extended period of time under a wide variety of operating conditions, the conclusions may be valid regardless of basic misunderstandings of the magnetic recording method.

* *Elements of Sound Recording*, by Frayne & Wolfe, John Wiley & Sons, 1949.

## Simplex Joins GPL

Simplex, formerly International Projector Corporation, is now a subsidiary of General Precision Laboratory, removed from its status as subsidiary of General Precision Equipment Corporation. John L. Alden will continue as president and chief executive officer.

The move, according to Hermann G. Place, president of GPE, was made "to bring about the dual advantage of placing greater manufacturing facilities under direct GPL control and of making GPL's extensive research facilities more readily available for work with Simplex's many projects in improving motion picture theatre projection equipment."

Simplex also will handle current and future orders for airborne Doppler navigation equipment. GPL has recently received an Air Force contract for an additional $17,000,000 worth of Doppler equipment.

## RCA Nets $40,031,000

RCA has announced a net profit of $40,031,000 for last year, equal to $2.65 per common share. Also noted was that the corporation did the largest volume of business in its history in 1956. Sales amounted to $1,127,744,000, an increase of 7% over 1955.

The function of this department is to provide a forum for the exchange of news and views relative to individual and group activities by members of the organized projectionist craft and its affiliates. Contributions relative to technical and social phases of craft activity are invited.

# *In The* SPOTLIGHT

ALTHOUGH nothing definite has been decided, there is a possibility that this year will see, at long last, New York City under one projectionist union. Tentative negotiations to have IA Local 306 absorb the membership of the Independent Motion Picture Machine Operators and Television Employees Inc. are under way. The situation appears hopeful, and Local officials are cautiously optimistic.

The small independent organization has been a nuisance value in the metropolitan area since 1940. Since Local 306 has the representation in Broadway, circuit, and the better neighborhood houses, the independent outfit has confined its representation to fringe and secondary theatres, and it is the fringe theatres that are usually the first casualties when theatres start to close.

Dependent on the state of theatre business this year, if negotiations are realized, they probably will be signed around the end of the year. It is expected that a deal of this sort will be beneficial to all. The past 17 years of jurisdictional clashes here and there has not helped anybody, including the exhibitor, and it is an advantage to him to have one source, one union, and certainly the Independent's members have been working at a lower wage scale and below-standards conditions.

Since it is the welfare of the projectionist that is the heart of this matter, IP for one hopes it all can be consummated with amity and cooperation.

• Among the many door prizes presented to holders of lucky tickets at the February meeting of the Los Angeles Union Label Council meeting were two tickets to a special showing of "Around the World in 80 Days," donated by IA Local 150 and presented to the winners by the Local's business representative, George J. Schaffer. The awards were part of a campaign sponsored by the affiliated Local Unions of the Council to promote and popularize union made products and services. Other members of the Council also donated door prizes, all of which were union made products.

**In Memoriam**
**HARRY SHERMAN**
**March 3, 1952**

• With the recent establishment by the IA of a new department for the enrollment of members of the Colosseum of Motion Picture Salesmen, all classes of employes connected with the film exchanges are now under the jurisdiction of the Alliance. Application of the Colosseum to join the Alliance was approved by the IA general executive board at its recent midwinter meeting. New contract negotiations between the Colosseum and the major distributors are now under way, and the IA general office has promised to assist the salesmen in their demands.

• Local 386, Columbus, Ohio recently observed its 38th anniversary at a celebration held at Lincoln Lodge in Columbus.

• The Credit Union established March 1956 by members of Winnipeg Local 299 reported at the end of its fiscal year, December 31, 1956, sufficient profits on hand to declare a dividend of 2½%. The first annual meeting is scheduled to take place some time this month, when the rate of dividends will be set and approved by the Credit Union's board of directors.

• At the recent mid-term election held by St. Louis Local 143 Ralph Robertson, Emil Werner, Sr., and George H. Oonk were re-elected to the executive board, and Harry Lang was elected trustee.

• A proposed pension plan for Local 299, Winnipeg, Man., was approved by the membership at a special meeting held on January 20. A representative of an organization specializing in setting up such plans addressed the gathering and explained the various types of welfare plans now in existence. After his talk, a bull session was held in which many points raised by the members were cleared. The final decision was approval of a plan based on equal contributions by employers and employes. Once such a plan has been worked out and agreed to by all parties concerned, it will then have to be submitted to the Canadian government for final approval. J. Cooper, president of the Local, is a staunch advocate of pension plans and has spent considerable time in careful research and investigation of their benefits.

### 25-30 Club Notes

• Our apologies to Messrs. Jack Winick and Abe Kessler for failing to credit them, as chairman and co-chairman, respectively, of the arrangements committee for the huge success of the party given in honor of Mr. X, mentioned in IP's "Spotlight" columns for January. They did a grand job and certainly deserve a round of applause for their efforts.

The January meeting had a record

### PRIZE WINNERS AT LOS ANGELES UNION LABEL COUNCIL MEET

George J. Schaffer (center), business representative for Los Angeles Local 150, presents prize winners Amos Hurley (Electrical Workers Union), and Leonard Helker (Beer Bottlers Union) with invitations to "Around the World in 80 Days." Tickets were donated by Local 150.

turnout with many industry notables in attendance. On behalf of the Club, Morris Rotker presented IA President Walsh with a check (proceeds from carbon copper drippings collected by the members) for the Will Rogers Memorial Hospital.

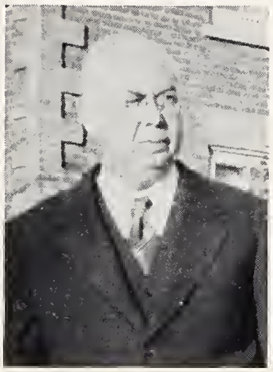
Allen G. Smith, New York City branch manager for National Theatre Supply Co. was presented with a beautiful set of gold cuff links as a token of esteem in which he is held by the Club membership. The presentation was made by Jack Winick, past president of the Club.

Club President Nat Doragoff presented Anthony Boscorelli, past president, with a set of silver service. Silver retirement cards were distributed by Abe Kessler, also a past president.

Among those present were John Alden and Arthur Meyer, International Projector; Paul Reis, National Carbon; Ed Lachman, Lorraine Carbons; and Irving Merkur, Ace Electric Mfg.

• Rounding out a half century as a projectionist, Ernest Young, secretary-treasurer of Local 432, Peterboro, Ont., Canada, has a wealth of memories about the early days of the motion picture industry. After 50 years of active work in the theatre, he is still a movie fan and enjoys his work as much today as he did when he projected his first picture as a lad of 18.

Born in Swansea, South Wales, Young went to work at the age of 15 as an apprentice electrician, and three years later took a job with Poole's Myrioramas, a type of entertainment popular in England many years ago and which has since faded from the scene. This was a traveling show in which about 60 large still pictures (each one approximately 25 feet wide by 15 feet high) depicting topical events were shown one at a time and were described by a lecturer. In addition to the pictures, Poole's Myrioramas also presented several vaudeville acts. Movies of the type known as "slapstick" were shown between the acts and



Ernest E. Young, secretary, Local 432, Peterborough, Ont., Canada.

it was Young's job to run them off during the three-minute wait for the next act. After a number of seasons with the Myrioramas, he settled in Bolton, England, where he worked as a theatre projectionist for 19 years. Young served with the British Army during World War I and was in charge of mobile movies shown to the troops at various army camps. In 1924 he moved to Georgetown, Ont., later going on to Peterboro, where he has remained for the past 16 years. He is presently employed as projectionist at the Odeon Theatre in Peterboro, a position he has held since the theatre opened nine years ago.

### *Walter F. Diehl, Appointed IA Assistant President*

Walter F. Diehl, IA representative since 1954, has been appointed to the office of assistant International president. The appointment, made by IA President Richard F. Walsh, was unanimously approved by the general executive board at the recent mid-winter meeting in Philadelphia.

A member of Local 182, Boston, Mass., Walter Diehl held the office of business representative for the Local for eight years prior to his appointment as IA representative. He has served on the minimum wage commission for the amusement industry in Massachusetts; he was a member of the executive board of the Boston Central Labor Union, and has served as labor representative for the Suffolk County March of Dimes.

## IA ELECTIONS

LOCAL 181, BALTIMORE, MD.

George Dusman, *pres.;* Chas. Grauling, *1st vice-pres.;* Chas. Dotson, *2nd vice-pres.;* Hal Braswell, *3rd vice-pres.;* Thomas P. Finn, Sr., *fin. sec.-treas.;* Thurman L. Durst, *rec.-sec.;* Maurice Rushworth, *bus. rep.;* Elmer Kastner, *sgt.-at-arms;* Ralph W. Rushworth, John H. Gentile, John W. Hawkins, *trustees;* Roland L. Tankersley, Louis Sieber, *wage scale committee.*

LOCAL 273, NEW HAVEN, CONN.

Anthony Basilicato, *pres.;* A. Nelson Frazier, *vice-pres.;* Benjamin Estra, *sec.;* Edwin Boppert, *treas.;* Ernest De Gross, *bus. rep.;* Isadore Stein, Louis LaVorgna, *exec. board.*

LOCAL 304, WATERBURY, CONN.

Thomas Gandy, *pres.;* Joseph Mazieka, *vice-pres.;* Frank Carey, *fin.-sec.;* Francis LaFlamme, *rec.-sec.;* Ralph DiPietro, *bus. rep.;* Jack Rabbott, R. DiPietro, T. Gandy, J. Mazieka, F. Carey, *trustees;* Abe Fandiller, DiPietro, Gandy, Rabbott, Carey, *exec. board.*

LOCAL 330, FT. WORTH, TEXAS

W. C. Austin, *pres.;* Henry Woods, Jr., *vice-pres.;* V. O. Huffines, *fin.-sec.;* B. Y. Coffman, *corr.-sec.;* R. R. Thompson, Sr., *treas.;* R. C. Sparks, *bus. rep.;* James Dodd, *sgt.-at-arms;* W. E. Gilbert, O. W. Sandidge, *exec. board;* E. L. Young, C. E. Head, John Steele, *exam. board.*

LOCAL 439, NEW LONDON, CONN.

Winslow W. Lucas, *pres.;* Eric Crawshaw, *vice-pres.;* Benjamin Rose, *rec.-sec.;* John S. Kane, *fin.-treas.;* Fred Nowell, *bus. rep.;* Leslie Nowell, Thomas Kenure, Anthony Osowski, *trustees and exec. board members.*

### Seating Doubled in 10 Years

Theatre seating capacity in both indoor and drive-in houses has more than doubled in the past 10 years, according to Albert Sindlinger, industry analyst. Nearly 27,000,000 patrons can be seated at any one time. Expansion of the drive-in industry is given credit, but the statistician also noted that there has been an increase in indoor capacity as well.

### French Take Increases

A 4% increase of patronage over 1955 is reported by the French motion picture industry. 410,000,000 moviegoers paid a total of 28,500,000,000 francs in France and foreign countries for French issues. 48.2% of the films were French-made, the U. S. product accounting for 34%.

**A multiple choice pushbutton arrangement for open and close coils can be a problem; here's a solution.**

# A Practical, Simplified Dowser System

By JOSEPH HOLT

Member, IA Local 428, Stockton, Calif.

IN ROOMS equipped with more than one pair of projectors, stereo and effect projectors, it is common to see a rather cumbersome panel brought out at each station containing multiple choice pushbuttons in order to select the proper close and open coils in the affected projectors.

The author has been impressed on several occasions with the inconvenience and chance for error which exists as a result of the conventional arrangement which has been described. In order to bring the operation of a dowser system down to its best and simplest form, it would be the final and most desirable result if one pushbutton at each station would take care of the entire job, regardless of the operation sequence.

Figure 1 illustrates the connection pattern for a three-projector installation with effect and/or stereo projector, or alternately four projectors. Analysis of the diagram will show that the two-pole normally open relays K1, K2, K3, and K4 are operated by coil connections to a momentary switch corresponding to the projector station number. The use of relays at this point in the circuit will permit the duplication of the individual controls for each station at a master console.

### *Step-by-Step Analysis*

Of greater importance is the fact that if relay 4 is the one assigned to the effect projector, this control button on relay K4 may be paralleled and duplicated throughout the room as an emergency button to close any of the three projector dowsers. This feature will provide remote closing of any projector dowser without the time-consuming check as to which projector is operating at the moment. This "all-off" button is an invaluable ally in the case of film breaks.

Step-by-step analysis of the relay operation indicates the following effects: If the momentary switch which closes the circuit in the coil of KI is depressed, both contacts of KI are closed, and the 115 v., AC supply is furnished to the opening coil of projector 1 through the lower contact of K1. The upper contact furnishes supply voltage to the center contact of K5, which in a de-energized condition furnishes a continuous path through its upper contacts to the closing coil of projectors 2, 3, and 4. Thus is the provision made for an incoming reel to projector 1, while any of the other units which may be in use are closed.

The circuit is symmetrical when relay K3 is energized, except that a circuit trace shows that the closure of K3 furnishes voltage to the opening coil of projector 3, and energy to the closing coils of 1, 2, and 4 through the closed contacts of K6.

In the case of projector 2, K2 furnishes voltage to the opening coil of projector 2, and from the same contact the coil of K5 is energized. Upon the closure of K5, the voltage furnished from the upper contact of K2 is applied to the closing coils of 1, 3, and 4. It is understood that the supply is the "hot" side of the line, while each relay coil and dowser coil, when connected to the switching network is able to complete the circuit through a common ground connected to the appropriate side of the line.

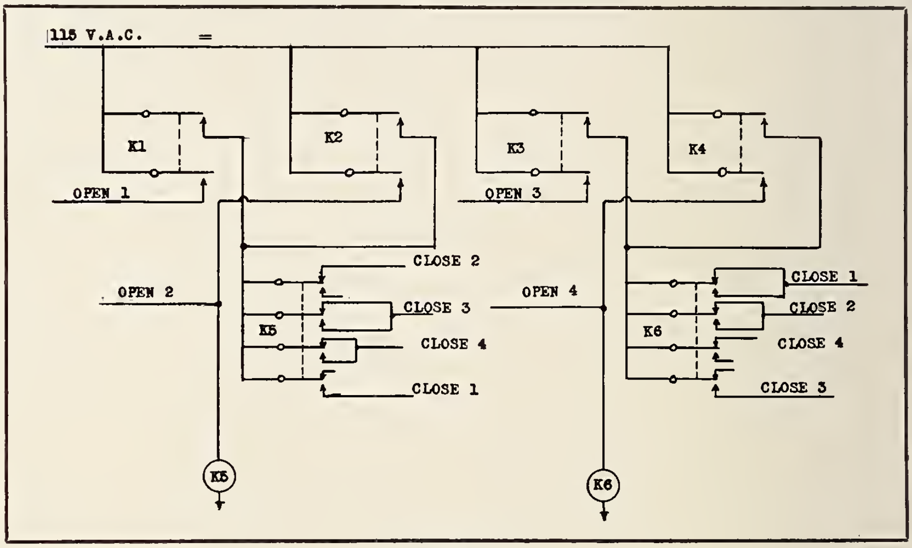



**FIGURE 1**

### *Circuit Expansion*

Expansion of the basic circuit is possible, but additional contacts and relays will be required. For the present requirements, it is noted that K1, K2, K3, and K4 require only about a five ampere inductive rating. On the other hand, about ten amperes inductive will be the make-break current of each upper contact of the relays specified. K5 and K6 need break only three amperes inductive per pole.

Due to the normal inductance to be encountered in the normal relay coil,

## Somebody Goofed

We don't know how often this goes on, but 5 will get you 10 that the instance we came across the other day has been repeated. And it's just another example of the unforunate projectionist getting the cat-calls for something entirely out of his province.

This happened in a small theatre in a small town out West, but it could have been anywhere. We quote the manager: "Terrific show that did well at the boxoffice, but somebody goofed. The fifth reel was in CinemaScope, while the others were not. Our projectionist wasn't very happy."

We can imagine. We also think it's about time the boom was lowered on this.

# A History of Anamorphic Lenses†

## By RUDOLPH KINGSLAKE

Sir David Brewster (1781-1868) is generally credited with the discovery that a refracting prism when tilted away from the minimum-deviation position has the effect of compressing or stretching an image in one direction while leaving it unchanged in the perpendicular direction.

In practice a single prism is never used for this purpose because of its chromatic dispersion and because it deviates the beam through an angle, but by the use of two prisms, preferably achromatized, the latter objections can be removed and a direct-vision anamorphoser can be readily constructed (Fig. 1). The degree of compression can be varied by rotating the prisms in opposite

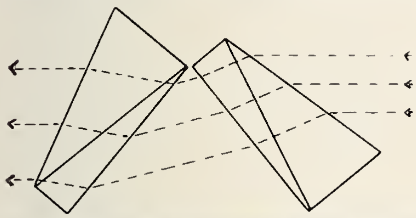


FIG. 1. A pair of achromatized Brewster prisms used to expand a projected image anamorphically.

directions through approximately equal angles.

The use of a pair of Brewster prisms as "an instrument or toy" to vary the height or breadth of an image was patented in 1889 (Br. 8409) by John Anderton of Birmingham, England. In 1905 W. E. Phillips of Colorado patented (U. S. 818,553) an arrangement by which the prisms could be conveniently mounted in front of a camera lens, with a linkage to ensure that both prisms would rotate through equal angles. Many other patents followed covering mechanical details and also describing means for removing the small residuals of color and distortion exhibited by the pair of simple prisms ordinarily employed.

† Originally published in "Image," magazine of the George Eastman House, November 1956.

Prisms are, however, not the only way by which an image compression in one meridian can be obtained. A suitable pair of cylindrical lenses can also be used, which may be either a positive and negative pair with parallel cylindrical axes, combined with an ordinary spherical lens, or a pair of positive lenses with the cylindrical axes perpendicular to each other (Fig. 2).

A device of this latter kind was patented as early as 1862 (Brit. 1453) by Leon Farrenc of Paris, and both arrangements were patented in 1898 (Brit. 8512) by Paul Rudolph of Jena. A cylindrical-lens anamorphoser has a fixed compression ratio depending on the powers of the lenses.

### First Applications

Anamorphic compression has found little application in still photography, but it has been very successfully used in motion pictures. The first application to this field was that proposed in 1910 by Ernesto Zollinger of Turin, Italy (U.S. Patent 1,032,172). Zollinger's first claim reads, "The art of producing moving pictures, which comprises deforming the picture on the film by reducing one of its dimensions to a fraction thereof and projecting the deformed picture through a deformer to reconstruct the projection to normal proportions."

Actually, Zollinger's principal aim in this invention was to save film by compressing the picture vertically to half its normal height and then restoring its size and shape in projection.

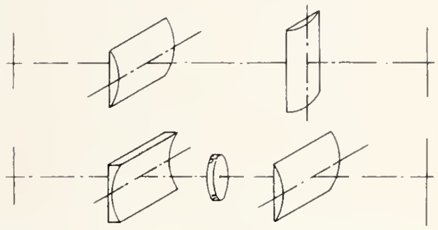


FIG. 2. Two arrangements of cylindrical-lens anamorphasers.

### Chretien's Patent

The French scientist Henri Chrètien patented an identical proposal in 1928 (U.S. 1,829,633 and 4), but with the aim of photographing an object having an exceptionally broad or exceptionally high format onto the normal ¾ x 1-inch film frame. He later (U.S. 1,962,892, Sept. 1929) described an afocal cylindrical at-

(*Continued on page* 35)

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it will be necessary to provide adequate filtering at the point of origination of transient pulses or inductive voltage "kicks." These will be damped under practically all service conditions by the shunting of a 1 mfd. 600-volt paper condenser across each relay coil. The reader will perhaps wish to reduce the remaining paths of the circuit to tabulated form, and for comparison purposes, the tabulation shown in Fig. 2 is recommended.

FIGURE 2

| RELAY NO. | OPENING DOWSER COILS | | | | | | CLOSING DOWSER COILS | | | | | K5 | K6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| K1 | | 1 | 2 | 3 | 4 | | 1 | 2 | 3 | 4 | | | |
| K1 | | X | | | | | | X | X | X | | | |
| K2 | | | X | | | | X | | X | X | | X | |
| K3 | | | | X | | | X | X | | X | | | |
| K4 | | | | | X | | X | X | X | | | | X |
| X: SIGNIFIES ENERGIZED CONDITION | | | | | | | | | | | | | |

GRIPES? PROBLEMS? SEND 'EM IN.

# Projection CLINIC

## The Effectiveness of "Studio Guide Rails"

*ARE THE "studio guide rails" of such mechanisms as the Simplex E-7 and XL and the Motiograph K effective means for guiding the film laterally through the projector gate?*

The purpose of "studio guides" in such studio and laboratory apparatus as cameras, sound recorders, and printers is to maintain correct lateral positioning of the moving film and to prevent excessive sidewise movements. This demands a distance between the inner surfaces of the film-edge guiding rails exactly equal to the width of fresh film. The width of freshly manufactured 35-mm raw stock is 1.378 inches, which equals 35.0 millimeters.

Almost from the very moment of its manufacture and processing, however, motion-picture film loses moisture and base solvents and begins to shrink. A loss of 0.5% in width, which results in a film width of 1.371" = 34.8 mm, is not uncommon in used projection prints and in camera negatives and laboratory dupes and masters which have been stored in warm, dry air for long periods of time. Nitrate films shrank even as much as 1.5%!

It is therefore evident that projector edge-guiding rails adjusted to the width of fresh triacetate film are a trifle too far apart for effective lateral guiding when "seasoned" prints are run. On the other hand, guide rails set for shrunken film will "pinch" and buckle fresh, unshrunken prints.

### Too Wide Spacing

In practice, therefore, studio guide rails in projectors are set a little farther apart than is necessary for the great majority of prints shown in theatres. Either fresh 35-mm raw stock or a gauge block of the same width should be used for setting them when of the adjustable-width type. But too wide a spacing causes jerky sidesway of the picture when the film "brings up" against the rails, and their effectiveness in guiding the film is all but lost!

As a result, the flanged lateral-guide roller at the top of the gate must assume the main job of edge-guiding the film, as in older projectors having no studio guides. What, then, is the good of studio guides in *projectors?*

The studio guides of the Simplex E-7 and the Motiograph K were originally intended to function as in studio apparatus, i.e. to reduce sidewise movements of the traveling film. It was found, however, that different film widths due to varying degrees of shrinkage reduced the effectiveness of the guides very seriously and made sidesway more conspicuous than ever by imparting sudden movements to it.

Motiograph's answer to the problem was complete abandonment of studio guides and the adoption, in the Models AA and AAA, of an extra flanged guide roller located between the picture aperture and the intermittent sprocket. The use of two flanged guide rollers is the best preventative of sidesway yet devised for projectors.

### Curved Gate Use

Now that the Simplex Equipment Corp. (formerly the International Projector Corp.) has made available an alternative curved film gate for the Simplex XL, the studio guides of the "flat-gate" XL mechanism are regarded in a new light. They serve primarily as a *reference surface* to simplify accurate setting (lateral position) of the guide roller and the intermittent sprocket. The guides also function as a positive stop when the gate is closed. In the new XL curved gate there are no studio guides; and the flanged guide roller and sprocket are adjusted with the aid of special gauges.

Projectionists operating on mechanisms having studio guides should therefore not neglect adjusting the flanged lateral guide roller correctly. The rails, themselves, may be ignored so long as they are in good condition and far enough apart to accommodate fresh film. If they are too close together, prints having maximum 35-mm film width will buckle over the aperture, interfering with the focus of the picture. Guide rails which have become grooved by film must be replaced without delay.

### Mirror Differences

*WHAT IS the difference between* elliptical *and* parabolic *arc-lamp mirrors?*

The difference, optically important though physically slight, is in the *curvature* of the concave reflecting surfaces of the lamp mirrors. The simplest concave mirror is, of course, the "spherical" reflector. In this, the *circle* forms the basis of the curvature. A spherical mirror has but one focus, namely, the center of the sphere "generated" by a circle rotating around a line drawn as its diameter.

Spherical mirrors are used in mazda lamphouses to focus an image of the glowing tungsten filament upon the actual filament of the bulb, thus increasing the brightness of the light and the smoothness of the screen illumination. The "object" (filament) and "image" (image of filament) thus occupy the same focus—the one and only focus of a spherical mirror.

Ellipses and parabolas, like circles, are *conic sections*, i.e. they are produced whenever a cone is "sliced" in various directions. An *ellipse* is an oval-shaped figure, or elongated circle, having two

## Announce New Lorraine Carbon Pairings

Designed especially for the new lamps requiring 13.6-mm positives and 7/16" or ½" negatives ranging from 135 to 165 amperes, two newly developed Lorraine Orlux carbon pairings have been released by Carbons, Inc., distributors of Lorraine carbons. Specifications for the new products:

Lorraine Orlux 13.6-mm X 18" Grade 552-09 Positives
Lorraine Orlux 7/16" X 9" Grade 555C Negatives

and

Lorraine Orlux 13.6-mm X 20" Grade 553-01 Positives
Lorraine Orlux ½" X 9" Grade 555C Negatives

Recognizing the onset of larger screens and 55- 65- 70-mm film, the carbons have been on test with certain large circuits and lamp manufacturers for over a year.

Claimed for the new pairings are: larger crater diameter, greater arc stability, increased distribution of light, and an absence of bombardment of particles onto the reflector's surface. The distributors assert that it is possible to have 95% to 100% distribution of improved light over entire screen area.

The new features are incorporated in the shell and core of the high intensity, inner-serrated-shell 13.6-mm carbons, and the intermediate high intensity products, specifically the star-cored 9-, 10-, and 11-mm grade 552-09 black carbons. (Grade 552-09 is similar to the grade of the new star-cored 13.6-mm X 18" carbons.)

The manufacturer emphasizes that the 7/16" X 9" grade 555C negative be used only with the Lorraine Orlux 13.6-mm X 18" grade 552-09 positive at 135 to 165 amperes, or with the Lorraine Orlux 11-mm X 20" grade 552-09 positive when used at amperages around 130 amperes.

## Thrillarama Lukewarm

Thrillarama, the new widescreen process that has been having trouble, opened to a somewhat lukewarm reception in Philadelphia. "Thrillarama Adventure," the initial venture, did not impress as much as the rival Cinerama, nor provide as much a sense of audience participation.

One of the main distractions was that the picture joining seam running down the center of the adjustable 70-by-20-foot screen was readily visible—a problem that has plagued the process since its experimental debut last year. The process employs two projectors, and there was a noticeable color difference between the two picture halves. The alignment of the two halves was poor at the first performance, but it is said this is to be corrected by a device which arrived too late for the opening. Binaural magnetic sound and the music score were satisfactory.

"Thrillarama Adventure" is a 90-minute average travelogue shown on a special screen placed in front of the theatre's regular one. It is claimed that the process, because it is mobile, will be able to play many places that Cinerama cannot. More subjects are planned, depending on initial reception.



foci (denoted by $F_1$ and $F_2$ in the accompanying drawing).

The elliptical type of mirror surface is generated by rotating an ellipse around its longest axis, called the "major axis." An elliptical mirror forms a distinct image of the light source at one focus when the source, itself, is placed in the other focus. This is why elliptical mirrors are used in conventional arc-lamp optical systems: the source (crater of the positive carbon) at $F_1$ is sharply imaged as a "spot" upon the picture-mechanism aperture at $F_2$.

### *Parabolic Mirror*

A *parabola*, unlike a circle or ellipse, is an *open* curve. The two open sides tend to become more and more nearly parallel as they are extended, but they never meet. The mirror curvature generated by a rotating parabola is used for reflecting light from a concentrated source in a beam of essentially parallel rays. Searchlights and auto headlights accordingly employ parabolic mirrors. A certain old-style low-intensity reflector lamp also used a parabolic mirror: the mirror reflected a parallel beam of light upon a large thin lens which converged it as a spot upon the aperture.

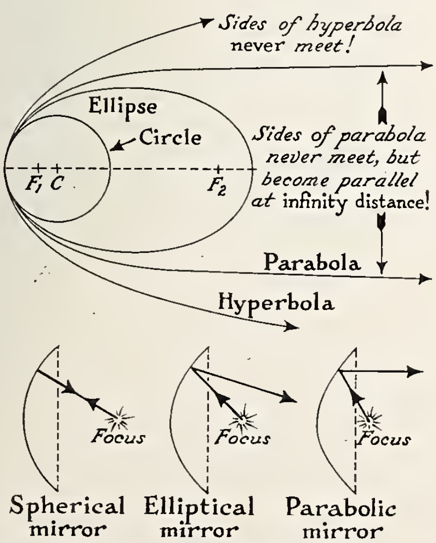


FIGURE 1

The remaining conic section shown in the diagram is the *hyperbola.* The sides of this open curve, extended, keep getting farther and farther apart. Except for special optical instruments used in scientific research, hyperbolic mirrors point (or, more exactly, the focus of an hyperbola lies *beyond* infinity).

The conic sections are fundamental in Nature's scheme of things. The curved paths, or orbits, of moons, planets, stars, and other celestial bodies are sections of the cone. A celestial body rushing toward the earth from space will revolve around our world in a circular or elliptical orbit, like the moon, unless its speed exceed a certain "critical velocity." If the intruder break the celestial speed limit, then it perforce must swing back into the depths of outer space in a parabolic or hyperbolic path, never to return. There is thus a striking similarity between the curvatures of our arc-lamp mirrors and the "timeless orbits" of the stars!

# NITRATE versus ACETATE FILM SAFETY†

**A series of tests conducted by NFPA emphatically illustrates the combustion differences between the old and the new film.**

By ALLEN L. COBB
Fire Protection & Safety Dept.
Eastman Kodak Company

SINCE 1950 all motion-picture film produced by the major U.S. and Canadian manufacturers for professional and amateur use has had a "safety" base of cellulose acetate or other material which burns slowly. Formerly, most film was made with a film base of cellulose nitrate. There still seems to be some confusion over the differences between these two types of film. Where "safety" film is used or stored exclusively, no special fire protection precautions are necessary.

While the change to acetate base film has been an accomplished fact domestically for about six years, some cellulose film is still in circulation and some nitrate film will be in storage for years for archival purposes. The NFPA Standards for the Storage and Handling of Cellulose Nitrate Motion Picture Film (NFPA No. 40) should be followed to safeguard life and property where this nitrate base film is being stored or handled.

This article illustrates the difference in the ignition and burning characteristics of the two types of film. It should be understood that cellulose nitrate contains chemically combined oxygen, sufficient in amount so that this material can partially burn or decompose without the presence of air. The gases formed by such decomposition are both toxic and flammable and may be produced so rapidly as to create a hazard to life and dangerous pressures in enclosed spaces. While the actual heat of combustion of nitrate film measured in British Thermal Units per pound is 6,000 to 8,000 compared with 8,000 to 9,000 for wood, the rate of combustion is about fifteen times that of wood in the same form.

FIG. 1. Nitrate film 15 sec after ignition.

Cellulose acetate film, in contrast, burns relatively slowly—about the same speed as paper—and the combustion products of burning safety film are much less toxic than the gases of cellulose nitrate.

### Loose-Film Burning Tests

At a series of tests, comparisons were made of the burning characteristics of nitrate and acetate films. Figure 1 shows the extent of a fire 15 sec after ignition of a pile of 1,000 ft of 35-mm nitrate motion-picture film which had been placed in a loose pile on the ground and ignited. The burning time was checked with a stop-watch at 38 sec. The nitrate film was completely consumed. Flames reached a height of approximately 12 ft and gave off no visible fumes but did show some fly ash.

In a comparative test, 1,000 ft of 35-mm acetate motion-picture film was placed in a loose pile on the ground and ignited using a small wad of wood excelsior. Figure 2 shows the resulting fire at its height. The burning time was recorded at 218 sec. The safety film was not completely consumed and showed evidence around the edges of melting and curling. The flames of the safety film did not exceed two feet in height and gave off a black smoke.

About 1,000 ft of heavy craft paper, 35-mm wide, was placed in a loose pile under similar conditions. In this case, the burning time was checked as 124 sec. The flames were approximately two feet in height and considerable blue smoke and fly ash were observed.

About 1,000 ft of cotton fabric, 35-mm wide, was similarly ignited. Burning time was 155 sec; flames did not exceed two feet in height; very little fly ash was observed although there was some blue smoke.

### Simulated Projector Fires

Two Simplex projector magazines were mounted on a frame in a such a way as to simulate the mounting distance which could be found on a theater projector. Acetate "safety" film, a full 1,000-ft roll, was placed in the top magazine with a strip of film leading down to the lower magazine which contained part of a roll of acetate film. The lower magazine door was left open and film was placed in a disorderly pile beneath as might be found in a theater following a film break. This small pile of film was ignited with a wad of excelsior and it was observed from Fig. 3 that while much

FIG. 2. Acetate film at height of fire.

†Reprinted from the October 1956 *Quarterly* of the National Fire Protection Association, Vol 50, No. 2.

FIG. 3. Simulated fire at projection on acetate film.

FIG. 4. Nitrate film during same simulated situation as in Fig. 3.

of the safety film on the ground was consumed, the flames did not carry up the streamers from the bottom magazine.

Figure 4 is the same test repeated but this time nitrate film was used in both the top and bottom magazines with the film streamers in approximately the same location. The loose nitrate film on the ground was set on fire and immediately the film in the lower magazine ignited and burned with considerable intensity. The streamers from the top magazine burned to the opening in the bottom of the magazine, setting off the roll in the top magazine which burned completely and with considerable intensity. It was observed that the intensity of the flames in both top and bottom magazines was sufficient to melt the white metal holders for the film rolls and to warp and bend the magazines.

Using a mock 35-mm process machine dryer section constructed of two-by-fours with Transite sides, top, bottom, and back with center partitions and doors made of acetate sheeting for visibility, acetate film was threaded throughout the machine to a windup roll on the outside. Film was looped from the windup roll down to the ground as could occur from a nonattended windup. This material was ignited with a wad of excelsior and the film on the ground burned without carrying up to the windup roll. The burnout time was 170 sec.

### *Nitrate Goes in 55 Sec.*

After the acetate was removed from the machine dryer section, the machine was threaded with 35-mm nitrate film in the same manner as the previous test. The nitrate film was ignited and in 55 sec the entire quantity of nitrate film was consumed. The fire burned from the loose pile on the ground up to and ignited the windup roll following the film strip from the machine to the roll and igniting the material looped inside the first section of the machine. It burned rapidly inside carrying through to the second section which burned almost immediately, and after the pressure built up inside the machine, the doors blew open and the heat was sufficient to melt some of the acetate on the doors. It was interesting to note that the acetate material on the doors did not ignite and burn.

Approximately 40 lb. of acetate film was placed in a loose pile inside an enclosure approximately eight feet wide with an open face. The acetate film was ignited and the fire allowed to burn for about two minutes. A fire fighter using a dry chemical extinguisher readily extinguished the burning film.

Another test fire was ignited with 40 lb. of nitrate film substituted for the acetate. Here the fireman used a water spray nozzle to attempt extinguishment. The flames did not appear to diminish in intensity despite the application of water fog, and when the fire was finally extinguished practically all the nitrate film in the center of the pile had been consumed.

### Film Overheating Report

Set for issuance this fall, a report on the various factors affecting film overheating is being prepared by the Film Projection Practices Committee of the SMPTE. Due to the increasing requirements for higher light intensity, all operating personnel should be acquainted with these factors. The report group, under the chairmanship of Herb Behrens of DuPont intends the report to be in shape by June.

## PERSONAL NOTES

Eight Managers for RCA service regions have been appointed, it was announced by the technical products service department of RCA Service Co. They will be responsible for all field service and installation activities of the technical products department, which includes installation supervision and maintenance of RCA equipment used in theatres, industrial plants, etc.

Managers and their headquarters are: B. D. Bachin, Eastern Region, New York; M. E. Wheaton, Mideast Region, Philadelphia; C. L. Swinney, Southeast Region, Atlanta; W. W. Gilreath, Southwest Region, Dallas; E. D. Van Duyne, Westcentral Region, Kansas City; F. W. Hamre, Central Region, Chicago; H. M. Madison, Western Region, Hollywood; H. E. Frisbie, Eastcentral Region, Cleveland.

* * *

Robert Sackman, a vice president of the Ampex Corporation in California, has been named general manager of that firm. Joining Ampex in 1953 to establish

Robert Sackman

and manage its Washington District office, Sackman previously had headed a department of defense research and development branch devoted to recorders and data-processing systems. He is a member of the Institute of Radio Engineers, American Management Association, and the Instrument Society of America.

* * *

Paul P. Porter, Jr., advertising assistant in charge of x-ray and motion picture products for Du Pont Photo Products department, has advanced to advertising manager of that section. He has been with Du Pont since 1948 as an x-ray technical representative in the Cleveland and Philadelphia districts. His former post will be filled by R. L. Snowberger, x-ray technical reperesentative for New England territories.

* * *

Dr. Douglas H. Ewing, vice-president of RCA Laboratories, has been appointed vice-president of RCA's research and engineering department. This was one of several appointments announced for the research and engineering organizations. Also in the Laboratories, Dr. James Hillier, who has been chief engineer, is named general manager; Humboldt W. Leverenz, former director of the physical and chemical research laboratory, is now assistant director of research. Elsewhere, Dr. George H. Brown was appointed chief engineer of RCA's commercial electronics products.

* * *

Richard B. DeMallie, assistant general manager of the international division of the Eastman Kodak Company, has been appointed general manager of that divi-

Richard B. DeMallie

sion. With Kodak since 1924, DeMallie has been Kodak's sales manager in Cuba, the Phillippine Islands, and Japan, returning to the Rochester office in 1939. He is a member of the Export Managers Club of New York, National Foreign Trade Council of New York, and the Rochester Chamber of Commerce.

* * *

New presidents of two RCA associated companies in South America have been elected. Richard T. Scott has been promoted to president of RCA Victor Radio, S.A., of Brazil, and John P. Cougnenc has assumed the head post at RCA Victor Argentina, S.A.I.C. With RCA since 1953, Scott was associated with distribution in the RCA Eastern and Western sales regions. Cougnenc, who joined the firm in 1942, was previously vice-president and operations manager of RCA Vietor Argentina.

* * *

Noble C. Ferguson, manager of the editorial service bureau of Eastman Kodak Company's advertising department since 1936, will retire this spring. Having had long experience as writer and editor on various wid-West newspapers, Ferguson is a specialist in newspaper promotion and publicity. In 1941 he was awarded he Silver Medal of the U.S. Treasury for his publicity services in connection with promotion of war bond sales. Among others, Ferguson is a member of the Photographic Society of America, the National Newspaper Promotion Association, and the National Geographic Society.

* * *

J. W. "Bill" Cosby is the new manager of arc carbon sales for National Carbon Company, succeeding E. R. Geib, well-known throughout the industry through nearly 50 years association with that

J. W. Cosby

firm. Geib will stay on as arc carbon sales consultant.

Cosby, who joined National Carbon in 1950 as a production engineer, will be responsible for national sales of arc carbons for motion picture projection. motion picture and television studio lighting, photoengraving, searchlights, and other industrial lighting applications of the carbon arc. He will also direct sales of spectroscopic electrodes and powders used in analytical work.

* * *

Robert N. Emerson, of RCA's Theatre and Industrial Products department, has

been named that section's field sales representative for RCA 16-mm sound motion picture film projectors in the West and Southwest regions. Emerson, seven years with the department's commercial service activity, will represent RCA audi-visual equipment in Colorado, Iowa, Kansas, Missouri, Nebraska, Oklahoma, South Dakota, and Texas. The audio-visual line includes Senior and Junior models of 16-mm sound projectors, a magnetic recorder projector, and a "Porto-Arc" arc-type 16-mm projector.

* * *

Marcel Ruot, an assistant manager of the international division of Eastman Kodak Company, has announced his retirement after 30 years with the organization. Ruot, born in France, joined Pathe Cinema in London in 1909, and in 1923 was managing director of the distributing company for Pathe. He became managing director for Kodak-Pathe of France when Kodak took over the Pathe interests in 1927. After spending several years overseas, he came to the United States in 1950.

Marcel Ruot

Ruot is a member of the Rochester Chamber of Commerce, and has been chairman of the Chamber's world trade committee and second vice-president of the group's council on world affairs.

### Giant Kodak Exhibit

Eastman Kodak Company is preparing a series of 13 giant photomurals for the International Photographic Exposition to be held in Washington, D.C., March 22-April 1. The huge photographs, which range from 44 to 75 square feet in size, will be suspended 18 feet above a 7-foot revolving globe. The globe will be surrounded by 25 color transparencies showing representative retail outlets. Eleven of the photo-murals will be in full color, produced on Kodak Color material, Type C from 8 x 10 Ektacolor negatives, said to be the largest group of color prints ever assembled to this time.

### Exports Hit New Peak

A record $44,456,788 worth of motion picture film and equipment was exported last year. The Department of Commerce census noted a special increase in raw stock and 8-mm cameras and projectors.

## SMPTE Sound Recording Classes Begin at NYU

The SMPTE educational program, particularly the courses in Sound Recording and Laboratory Practice, is well under way. Starting in February, the classes have enjoyed complete attendance with many late applications being rejected. Enthusiasm for the courses, which are being co-sponsored by Motion Picture Studio Mechanics Local 52, IATSE, have encouraged the Society to consider more extensive plans for their educational program on both the East and West Coasts. The Society maintains that "there is a distinct possibility that advanced courses will be approved in the near future." Applications that arrived too late will be kept on file.

N. B. Cook, second from right, instructor at the first Sound Recording session of the courses inaugurated by the New York section of the SMPTE committee on education, confers with committee members after the opening session at New York University last month. Left to right, Edgar Schuller (DeLuxe Labs.); Vince Matthews, IA Local 52; Cook and Burton Perry (Westrex Co.), moderator.

Conducted in cooperation with New York University, each course is coordinated by a moderator, and the various instructors have been chosen from among the leading men in the industry.

Moderator for the Sound Recording course is Burton Perry, recording engineer of Westrex Corp. R. D. Whitmore of 20th-Fox is moderator for the Laboratory sessions.

Before the opening session of the Sound Recording course, N. B. Cook, chief engineer of Meter Service, Public Service Electric and Gas Co., New Jersey, lectured. He is scheduled for other courses later.

Other instructors will be: Cyril Harris, supervisor of the Acoustics Laboratory, Columbia University; Ray Griswold and Edward P. Ancona of RCA; Homer Elder, Dichter Sound Studios; Robert J. Engler, Westrex; Edward Schmidt and Ernest Franck of Reeves Sound Studio; John Maurer, consultant, and others.

John G. Frayne, engineering manager of Westrex heads the SMPTE Education Committee, vice-chairman being Herbert Barnett, assistant to the president of General Precision Equipment Corp.

Chairman of the subcommittee on the Education of Sound Technicians of the New York section is Edgar Schuller. James Kaylor heads the subcommittee on Laboratory Practice.

### Fair Features New Equipment

The latest foreign developments in motion picture equipment will be a feature at the United States World Trade Fair to be held at the New York Coliseum in April. With representations from 42 countries, each nation will maintain a special information center to give customers the necessary facts concerning product deliveries, import license requirements, currency restrictions, and investment opportunities. Considering the scope of the exposition, if a buyer were to cover the markets represented at the fair, it would require traveling around the world for a period of approximately two years.

### Electroluminescence Tests

Further development in electroluminescence has been made by the Lighting Division of Sylvania. The fluorescent engineers have developed a high-intensity 4-in.-sq. self-contained lamp of porcelainized steel and ceramic coating. Trade name of lamp still in experimental stage is Panelescent.

## BOOK REVIEW

FILM AND THE DIRECTOR, by Don Livingston, Macmillan, 1957, 209 pp., $4.50.

While of doubtful value to the projectionist craft, this volume is a fine achievement for what it sets out to do. As the title implies, the book is a fairly detailed account of the director's techniques and problems from the inception of a film to its canning. It is also intended to give associated technicians an idea of what goes on in the direction of a film.

The author, an experienced pro who has directed more than sixty films, has a good, straightforward writing style, and he makes his point clearly in a minimum of words. Besides a competent handling of the artistic and creative techniques, there is a comprehensive discussion of the more technical aspects: the camera, sound, lighting, set design, etc.

Of special interest, and one we don't often see in texts these days, is a practical evaluation of how to keep the budget down, and time-and-money short-cuts in production. Fully illustrated, this book is heartily recommended to anyone who wants to find out how movies are made and be entertained in the process.

### Drive-Ins Get Manco Screen

The Manco Vision luminous screen is planned for installation in the Apache Drive-In, Farmington, N.M., and the Sunset Drive-In, Canon City, Colo., and results will be studied by drive-in operators. The screen, developed by the Motion Picture Research Council, is made of six-inch aluminum squares which interlock, the squares being covered with ridges and grooves sprayed with fine crystals. New towers are being erected for the screens, which will be installed by engineers from the Research Council.

### Kodak Sales Up

Last year the sales and earnings of Eastman Kodak Company increased 7% over the previous year. A gross total of $761,689,559 sales business was done, with pre-tax earnings coming to $200,-162,004. Measured in dollars and cents, 1956 is considered by the company to be its best year.

## ANAMORPHIC LENSES

(*Continued from page* 27)

tachment lens called the Hypergonar (Fig. 3) by which this could be accomplished. He also proposed using a small lateral compression of the image to make room for a sound track on normal silent film.

Samples of Chrètien's lens were made at the time and publicly exhibited in Europe and in this country, but for various reasons the idea aroused no enthusiasm among those working in the motion-picture industry. Indeed, the device was

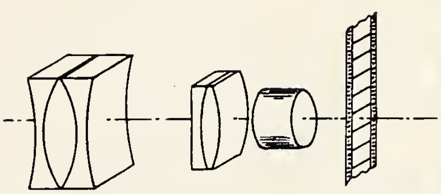

FIG. 3. The "Hypergonar" lens (from Chretien's patent).

completely forgotten until Twentieth Century-Fox adopted it in 1952 with tremendous success under the name of CinemaScope.

More recently Albert Bouwers of the Netherlands has devised a prismatic system (called Vistascope) in which two cylindrical reflecting surfaces (mirrors) are used to perform the roles of the usual two cylindrical lenses.

# The Ole Crank Twister

## . . . On Scratchin'

AT OUR Local Union meetings Bro. Coots Bugsby sits all alone by his self because nobody will sit closer than 6 rows away from him. And it ain't because anybody is mad at Coots, because nobody is. Coots is just considered *non grata persona* which is Latin, and means that the person referred to is host to certain predatory insects.

You might say that Coots got that way as a result of a bright idear by his Boss on how to get the Cozy Theatre outa the red. Instead of operating regular theatre hours, the Boss figgered that he could do a lot more business by operating from midnight to 8:00 a.m. In keeping with these unusual hours of operation he changed the name to the Cozy Nap Theatre. And, in perfect harmony with the new name, the Boss comes up with the startling innovation of featuring silent sound.

### The Cozy(?) Nap

It's astonishing how a change in policy will change the complex of the existing patronage of a theatre. The nocturnal patrons of the Cozy Nap now consists of people that prefers padded theatre seats, and silent sound, to the hard cots of a Front Street flophouse. It was shortly after the new and highly successful policy went into effect that the Boys began givin Bugsby the "go-bye" because he was allus scratchin, account of he was allus itchin.

As a gold card (senior grade) member, your narrator has to sit next to the Chairman at the metins, where he can impart advice and counsel in order that the Chairman won't go wrong on any of his rulins. From the safe vantage point of the rostrum, it was sure pathetic to see that pore lonesome boy sittin in the back row, shunned like he has the leprosy, and all because somebody has to work the Cozy Nap, and that somebody happins to be him.

The injustice of it all riles the Ole Twister to such a pitch that he starts swingin the crank handle around by informin the Assembly for just what they are—"intloerant hippocritters." That, and a lots more too, such as: they oughter be ashamed of themselves for persecuting a feller Brother, just because he is the victim of a occupational disorder. Furthermore, only a darn fool would act on their snide hints, and risk the perils of ketchin newmonia by bathing in the dead of the winter time, just to avoid a little itchin which is relieved by scratchin with no risks involved.

Some of these same sanitary Pharasees is themselves guilty of scratchin; and not the kind of scratchin that's considered vulgar when done in the parlor before company either, but the kind that makes a print look like a differential grating when they get through with a run. And this is just what provided Ole Twister with the opportunity to orate at length on the much needed subject of film scratchin, and its prevention.

### Locating the Cause

The whole problem in eliminating scratchin lies in determining *where* the stock is being scratched. Once the offending point is found, the remedy is so obvious that detailing the methods of elimination would amount to questioning the intelligence of moving picture operators—not to mention projectionists. There is nothing new about the system of finding the offending point in the projector, but judging from the number of scratched prints in circulation, a rehash seems to be in order.

With new opaque film stock make up a number of closed loops, three, six, and nine feet long. After making up the loops, store them in a film can with a damp cloth for several hours. This treatment will soften up the emulsion and make scratches readily detectable. If the scratchin is on the base side of the stock, the emulsion side goes IN on the loops. The reverse is true in searching for emulsion scratches.

### Testing the Trap

Test the trap first with a small loop. Twenty clicks as the patch goes through is sufficient. Then, with a larger loop, test the feed sprocket and upper valve, making sure that the loop rubs nothing as it revolves.

The same procedure applies to the lower sprocket and sound head, along with the take-up valve. It may be necessary to test the valves by driving the loop with the idler open, thus eliminating the idler roller. In stubborn cases, an individual search loop on each individual member, where the stock can possibly rub, will eventually reveal the source of scratching.

Bugsby's Boss also has been havin his troubles, too, besides scratchin. Every night, and way into the small hours of the morning, a picket line goes millin around in front of the Cozy Nap. The signs the pickets is carryin claims the Cozy Nap is "Unfair to the Flophouse Owners Pertective League, Incorporated. Please do not Patronize."

FRANK MACDONALD
Local 199, Detroit, Mich.



## OBITUARIES

SHEMACK, JOHN J., 60, president for the past 15 years of Local 410, Manitowoc, Wis., died recently at the Veterans' Hospital in Wood, Wis., a victim of leukemia. A member of the Local since 1924, he had worked as projectionist at the Mikado Theatre in Manitowoc for the last 30 years. He was a combat veteran of World War I and served for several years with the Army of Occupation in Germany. His wife and daughter survive him.

• • •

ROBINSON, GEORGE E., 66, charter member of Toronto Local 173, died suddenly on February 6. He was a projectionist at the old Pantages Theatre from August, 1920,

to the time of his death. He served as Tyler for Local 173 for more than 30 years, and was a member of the Famous Players 25-Year Club. He was a veteran of World War I serving with the 116th Signal Battalion.

• • •

GALLOWAY, JACK, 57, member of Local 165, Hollywood, Calif., died recently following a brief illness. A charter member of the Local, he worked as projectionist for M-G-M on the West Coast for 24 years. His wife survives him.

• • •

NIX, CLARENCE S., member of Local 249, Dallas, Texas, died last month following a lingering illness. He had worked for a number of years as projectionist at the Majestic screening room in Dallas, and was extremely popular with his fellow-workers.

### 99% Safety Stock Used

There is only about 1% inflammable stock in this country's vaults at the present time, and it is believed that the percentage of nitrate film in actual circulation is even lower. Industry experts indicate that nitrate will be out of circulation completely in a short while, which would be of importance in regard to insurance rates, building regulations, and personnel.

It has been the general opinion that no changes can be made until all releases are safety film, and while no major companies are releasing nitrate any more, there are still some small independent exchanges using it. With the exception of a few communities, distributors and theatres are not required to handle safety film only. It is being suggested that the industry, by joint action, replace all nitrate stock as soon as possible.

### SMPTE Standards Service

Five new proposed standards for 8-mm and 16-mm projector apertures, 32-mm film dimensions, and 16-mm sound projector test films will be made available to subscribers soon, SMPTE has announced. The standards service was initiated last year by the Society, which issues copies four times a year to subscribers. The service costs $7.50 annually.

### Art Circuit Disappearing?

One possible effect on the battle of the ratios is that the so-called Art House Circuit is gradually disappearing. At present, many quality pictures, foreign films, and those films labeled "art house product" are playing the bigger first-run theatres. The art house itself is no longer set apart from the main run of theatres, according to some distributors.

## ITALIAN PROJECTOR FOR WIDESCREEN

(*Continued from page* 13)

shutter between the large blades (Fig. 4). Either heat-absorbing glass filters or dichroic heat-reflecting filters having interference layers on the surface may be used. The former type was given preference in the XII T because of its lower absorption of visible light.

### *Absorption Filters*

Absorption-type filters have an indefinitely long life, as their performance is not contingent on a special

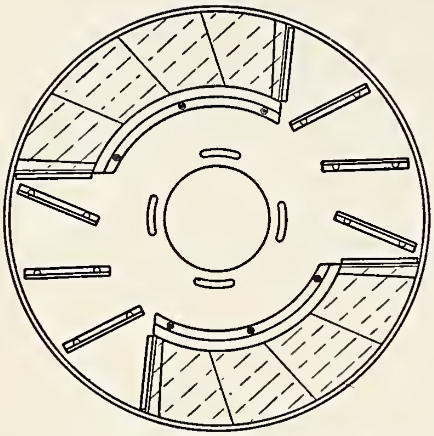

FIG. 4. The self-cooling shutter of the Fedi II T mechanism. Dotted lines represent the heat absorbing glass filters.

antireflection coating deposited upon the glass, but depends on the nature of the glass itself. The fact that these glasses tend to accumulate absorbed heat has not prevented their use. This trouble was overcome by ingeniously exploiting the high speed of rotation of the shutter and by providing the shutter blades with air-circulating fins to effect immediate cooling of the glasses as they leave the light beam.

This ingenious utilization of the shutter is worthy of serious consideration. By itself it removes heat from the light beam, and by itself it gives off the absorbed heat to the surrounding atmosphere. The same glass sector is brought thoroughly cooled into the light beam on each complete revolution.

Figure 5 suffices to reveal the efficiency of this cooling system. During projection via a 100-ampere arc, the film flows from the gate at about the same temperature it would have if arc current were only 50 amperes without the heat filters.

A modern projector should be provided with the means for both magnetic- and optical-track scanning. The XII T is now being unit-constructed with a magnetic head. Through unit construction of the picture mechanism and sound-reproducing components, it is possible to draw the film from the upper magazine and conduct it down through the magnetic scanner by means of two driven sprockets. The loops are large, and the film driven without vibration or undue stress.

It is evident that the magnetic tracks are scanned completely free from irregularities of movement. High- and low-frequency modulations due to irregularities in film travel are thus completely absent.

In accordance with European design, the optical soundhead is an integral component of the projector itself, but may be easily removed and replaced by another with extreme precision. The assembly of the optical reproducer is corrected to avoid all mechanical vibration of the photocell; and the entire film course is simple and free from sharp curves to obtain silent travel of the film without wear.

### *Lighting Arrangement*

The XII T projection apparatus is equipped with a large lamphouse able to accommodate carbon trims burning up to 100 amperes. Horizontal feeding of the carbons is achieved by means of a differential mechanism which insures regular consumption and even

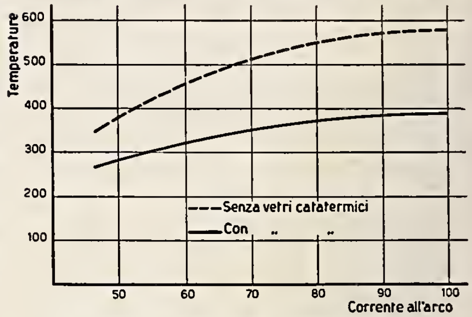


DIAGRAMMA TERMICO CENTRO QUAORUCCIO

FIG. 5. Temperature in projector aperture at various current values.

burning. The corrected-curve mirror 420-mm (16.548 inches) in diameter insures optimum concentration of the light beam upon the aperture.

Under normal projection conditions, the Fedi XII T projector permits good results to be obtained on screens of approximately 126 square meters (1,356.264 sq. ft.), corresponding to an 18-m X 7-m (59.054′ X 22.966′) CinemaScope screen. A light flux of 30,000 lumens at a current of 95 amperes can be obtained from this arc lamp when provided with an adequate trim of carbons and powered by a good rectifier.*****

***** We are unable, from the data provided, to offer verification of the claim of 30,000 lumens at 95 amps. The normal light flux at this current without the projector shutter running, with heat filters and with f:2 optics throughout, is 16,000 screen lumens.—ED.

---

## *Your Preference?*

**What would you like most to see covered in future issues of IP? We aim to please, and what YOU want to appear in the pages of this magazine is the most important thing to us. So, if there's a particular subject (or subjects—any number) on your mind, just fill in the lines below and return to us. We'll do the rest.**

INTERNATIONAL PROJECTIONIST, 19 West 44 St., New York 36, N. Y.

Gentlemen: I would like to see published in IP articles (and drawings) relating to the following subjects:

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## THAT IMPORTANT OPTICAL TRAIN

(Continued from page 10)

rectangular aperture, if one were present. At least one corner of the real picture will be optically matched—this much we may be sure about. Now assume another pinhole to be placed at the opposite corner of the real aperture. There are now two pinholes separated by the length of the *diagonal* of a real aperture—about 1 inch.

The lens, positioned to just intercept the cone of rays from the first pinhole, is obviously displaced in relation to the second pinhole. It intercepts *some* of the rays from pinhole no. 2, but not all of them. To intercept all of them, the *f*:1.9 lens will have to be shifted laterally about 1 inch. But then it will be out of line for pinhole no. 1.

### Lens Mismatching

To pick up all of the light from both pinholes at the same time, the lens will have to be increased in size. In other words, the *f*:1.9 lens will have to be replaced by a faster one—*f*:1.7, *f*:1.5, or even *f*:1.0. (We cannot tell. exactly, without knowing its focal length, the size and distance of the lamp mirror, etc., etc.)

Suppose we find that an *f*:1.5 lens just intercepts *all* of the light from *both* pinholes. We may now replace the pinholes with a real 35-mm film aperture; and the *f*:1.9 lamp optics will be *exactly matched* by the lens—in this illustrative case, by an *f*:1.5 lens. An *f*:1.9 lens thus *does not* match an *f*:1.9 lamp!

The foregoing is the gist of this very important matter. If it isn't entirely clear to you, please go over it once again, trying to visualize the stated conditions. If special questions arise, send them along to IP: we'll do our best to answer them.

On the basis of the foregoing discussion, we would caution against using lamps of greater speed rating than the projector lenses. Why "manufacture" light by burning up power and carbons only to waste it in the picture mechanism? If your lamps and lenses have the same speed rating, you may be reasonably sure of satisfactory screen results despite a slight optical mismatch, and even though the film receives somewhat more light than can be utilized by the slightly undersize lens. The most efficient setup employs lamps of moderate speed rating with the most rapid projection lenses (*f*:2.5 lamps with *f*:2.0 or *f*:1.9 lenses, for example, or *f*:2.0 or *f*:1.9 lamps with *f*:1.7 or *f*:1.5 lenses).

### Increased Speed Results

The sharpest screen images are obtained with lenses not exceeding a speed of *f*:2.0, though even faster lenses (*f*:1.7 and *f*:1.5) may be used in drive-ins and other large theatres where screen light is inadequate. (By actual measurement, an *f*:1.9 lens or lamp mirror gives 10% more light than an *f*:2.0 lens or mirror.)

There is an appreciable increase in screen light when *f*:1.9 lamp optics are substituted for *f*:2.5 optics *providing that the projection lens is correspondingly increased in speed.* If an *f*:1.9 lens is used with an *f*:2.5 lamp, and the lamp subsequently increased in speed to *f*:1.9, the increase in screen light is only slight, and occurs principally in the middle of the screen. It is absolutely inadvisable to use *f*:1.7 or *f*:1.5 lamp systems without also using lenses of similar speed ratings. From the physical point of view, the change from a speed of *f*:1.9 to *f*:1.7 in certain modern mirror lamps involves a substitution of 18-inch for 16-inch mirrors.

The actual luminous efficiency of

the projector optical train having a specified lamp-and-lens setup is of intense interest to practising projectionists. We always like to know how much light we are projecting—and how much we are losing *en route* from the positive crater to the projection lens.

The actual efficiency of even the most efficient projector optical train is not great. On the average, from 96% to 97% of the light emitted by the crater of the positive carbon adds nothing to the brightness of the projected picture. When blank light is projected *without* the shutter running, the optical efficiency of a theatre projector is 6% to 7%; *with* the shutter running, only 3% to 3½%. When film of average density is being projected, only a few tenths of one per cent of the light appears on the screen!

### *Utilization Percentage*

An $f$:2.5 lamp mirror or condensing lens picks up and projects to the aperture only about 35% of the *total light* emitted by the crater, or about 40% if the lamp speed is $f$:2.0. An $f$:2.0 coated projection lens utilizes only about 75% of the light emerging from the film aperture when the lamp has the same speed as the lens ($f$:2.0), or about 80% when the speed of the lamp is $f$:2.5. Since the mathematical products of 35 × 80% and 40 × 75% are close in value (28 and 30, respectively), there is only a very slight gain in light when changing from $f$:2.5 mirrors to the faster $f$:2.0 mirrors *if the projection lens remains at f:2.0.*

This statement will be questioned by many engineers, and yet it may be verified by experiment. *It explains why such good light is obtained in many theatres still using old-style "slow" lamps in conjunction with new "fast" projection lenses,* pictures very nearly as bright as those in other theatres having the same size and type of screen and burning the same arc current, but using faster lamps. The greatly increased optical efficiency of a lens having a *faster* speed rating than the lamp is definitely a factor of greater importance than the increased light-gathering power of a slightly larger lamp mirror.

From our average total mirror-and-lens transmission of about 29% we must subtract additional losses. The standard film aperture, for instance, transmits, on the average, about 25% of the light of the "spot," 75% being wasted on the aperture plate. And the revolving shutter has a transmission of only 50% or somewhat less. The aperture-shutter transmission is thus only 12.5%; and the total transmission of light by the projector optical system comes out to be 29 × 12.5% = 3.6%. Heat filters will remove another 8% or 10% of the light, and the port glass an additional 10%, bringing the total optical efficiency down to about 3%. (In the discussion to follow, we shall ignore filters and port glasses, as their losses may be compensated, in practice, by increased arc current, higher screen gain, and certain other adjustable factors.)

### *Rating Screen Lumens*

Because shutter transmissions vary somewhat in different projectors, 45% being the norm for fast-cutoff shutters and 40% for the older, less efficient types, it has been found advisable to ignore the shutter entirely in light measurements. "Screen lumens" (light flux issuing from the projection lens) are thus usually rated *without the shutter running.* We shall adhere to this custom for the sake of convenience, and begin by considering the luminous efficiency of the average well-adjusted theatre projector to be *twice* the values given above, viz. from 6% to 7%.

It is not necessary, however, to measure the light losses occasioned by

all the separate components of the optical train to find the luminous efficiency of a projector. We need only divide the number of lumens emerging from the projection lens *(no shutter!)* by the total number of lumens emitted by the light source — the glowing crater of the positive carbon.

The candlepower of carbon-arc craters may be accurately estimated; and from such data the total luminous flux in lumens may be found by multiplying the candlepower by a factor of approximately 5. (One half the factor $4\pi$ given in illumination formulas for a "uniform point source" is somewhat too great for the carbon-arc crater.) A projection arc rated at 57,000 candles thus emits $57{,}000 \times 5 = 285{,}000$ lumens.

Three examples, including a "simplified" HI mirror lamp, a rotating-positve mirror lamp, and a rotating-positive condenser lamp, follow. The results (between 6% and 7% efficiency for the average projector optical system) agree with the results obtained by combining all the separate light losses.

(1) An $f$:2.5 "simplified" HI mirror lamp burns 8-mm Suprex positives at 60 amperes. Candlepower = 34,000; total crater lumens = 170,000. Projector output = 11,000 screen lumens with $f$:2.0 lens. Overall optical efficiency = 11,000/170,000 = 0.0647 = 6.47%.

(2) An $f$:2.0 rotating-positive mirror lamp burns 11-mm regular positives at 120 amps. Candlepower = 61,000; total crater lumens = 305,000. Projector output = 21,500 screen lumens with $f$:2.0 lens. Overall optical efficiency = 21,500/305,000 = 0.0703 = 7.03%.

(3) An $f$:2.0 rotating-positive condenser lamp burns 13.6-mm Hitex positives at 180 amps. Candlepower = 71,000; total crater lumens = 355,000. Projector output = 25,000 screen lumens with $f$:2.0 lens. Overall optical efficiency = 25,000/355,000 = 0.0704 = 7.04%.

### *Luminous Efficiencies*

The luminous efficiency of a complex optical system is one thing, that of the entire system considered as a simple producer of light is another. The latter concerns the relative amount of energy fed to the system reappearing as useful light, and is expressed as *lumens per watt*. Many common illuminants, such as incandescent light bulbs, have efficiencies of from 5 to 30 lumens/watt. Fluorescent lamps sometimes attain efficiencies of several hundred lumens/watt, the theoretical maximum being nearly 700 L/W. The high-intensity carbon arc ranges from about 30 to more than 80 L/W, and hence must be regarded as one of the more efficient light producers.

But what of the luminous efficiency of the *entire system* consisting of arc-light source and projector optical train? When the shutter isn't running, the efficiency of a theatre projector ranges from slightly more than 2 to about $5\frac{1}{2}$ L/W. (These values are

cut approximately in half by the shutter.) The arc-projector system, therefore, is more efficient than gas and candle flames (½ to 1 L/W) in spite of the 96%-97% light loss in the optical train!

The accompanying two tables reveal a wealth of information on the production of light by a number of popular high-intensity arc lamps used in conjunction with *f*:2.0 (or *f*:1.9) coated projection lenses. Table A lists the screen-lumen outputs for both *f*:2.5 and *f*:2.0 "simplified" HI mirror lamps used with *f*:2.0 coated lenses only. Table B gives similar data for *f*:2.0 and *f*:1.7 rotating-positive HI lamps including condenser lamps burning 13.6-mm carbons. A difference to be kept in mind is the use of *f*:1.7 projection lenses with *f*:1.7 lamps.

## TABLE B. Rotating-Positive HI Arc-Lamp Data

| TRIM Pos. | TRIM Neg. | ARC AMPS. | ARC VOLTS | POSITIVE CONSUMP. (Inches/Hr.) | APPROX. CRATER CANDLE-POWER | LUMENS PER WATT | TOTAL SCREEN LUMENS (Standard aperture, no shutter) *f*:2.0 lens *f*:2.0 lamp | L/W | *f*:1.7 lens *f*:1.7 lamp | L/W |
|---|---|---|---|---|---|---|---|---|---|---|
| *Reg.* 9 mm | 5/16" | 75 | 50 | 15 | 42,500 | 62 | 15,000 | 4.0 | 17,000 | 4.5 |
| 9 | 5/16 | 85 | 55 | 22 | 51,000 | 60 | 18,000 | 3.8 | 20,500 | 4.4 |
| 10 | 11/32 | 90 | 55 | 18 | 45,500 | 51 | 16,000 | 3.2 | 18,500 | 3.7 |
| 10 | 11/32 | 100 | 60 | 20 | 57,000 | 52 | 20,000 | 3.3 | 23,000 | 3.8 |
| *Hitex* 10 mm | 3/8" | 120 | 60 | 18 | 54,000 | 40 | 19,000 | 2.6 | 22,000 | 3.1 |
| 10 | 3/8 | 125 | 65 | 20 | 62,500 | 42 | 22,000 | 2.7 | 26,500 | 3.3 |
| 10 | 3/8 | 130 | 70 | 25 | 68,000 | 41 | 24,000 | 2.6 | 27,500 | 3.0 |
| 10 | 3/8 | 135 | 70 | 32 | 74,000 | 43 | 26,000 | 2.8 | 30,000 | 3.2 |
| *Reg.* 11 mm | 3/8" | 120 | 65 | 20 | 61,000 | 43 | 21,500 | 2.8 | 24,500 | 3.2 |
| 12 | 7/16 | 125 | 65 | 15 | 62,000 | 42 | 22,000 | 2.7 | 26,500 | 3.3 |
| *Reg.* 13.6 mm | 7/16" | 120 | 65 | 5 | 41,000 | 29 | 14,500 | 1.9 | (16,500) | 2.1 |
| 13.6 | 7/16 | 130 | 70 | 7 | 48,500 | 29 | 17,000 | 1.9 | (19,500) | 2.1 |
| 13.6 | ½ | 140 | 70 | 10 | 54,000 | 30 | 19,000 | 2.1 | (22,000) | 2.4 |
| 13.6 | ½ | 150 | 75 | 14 | 59,500 | 30 | 21,000 | 1.9 | (24,000) | 2.1 |
| 13.6 | ½ | 160 | 80 | 18 | 64,000 | 28 | 22,500 | 1.8 | (27,000) | 2.1 |
| *Hitex* 13.6 mm | ½" | 170 | 75 | 16 | 65,500 | 28 | 23,000 | 1.8 | (26,500) | 2.1 |
| 13.6 | ½ | 180 | 75 | 22 | 71,000 | 29 | 25,000 | 1.9 | (29,000) | 2.1 |

### *"Off-Standard" Ratios*

The screen-lumen values given for 13.6-mm carbons at a lamp speed of *f*:1.7 apply to 18-inch mirror lamps only. These are not yet commercially available, although two mirror lamps burning 13.6-mm positives at "off-standard" current-and-voltage ratios have been placed on the market. The data in Table B do not apply to either of these new lamps, however, but assume normal currents and arc voltages and mirrors of lower magnification than the 18-inch mirrors used for 9-, 10-, and 11-mm carbons.

An examination of the lumen-per-watt values in these two tables shows that "simplified" HI mirror arcs have, on the average, about 1.5 times the luminous efficiency of rotating-positive mirror lamps, 2.4 times the efficiency of condenser lamps, and about 2.1 times the efficiency of 18-inch mirror lamps burning 13.6-mm rotating positives. The obvious inference is that smaller carbons have a higher luminous efficiency than the larger sizes, and that carbons burn most efficiently near their maximum rated current. Also, increase of voltage wastes power by requiring a longer arc gap, the resistance of which dissipates electrical energy. The lamphouse is made hotter, but no more light is produced.

### *A Final Word*

As a final word, we must strongly warn against faulty alignment of the various elements of the arc-lamp and projector optical train. Light output falls off very seriously when the positive crater is more than a small fraction of an inch away from its optimum focus, or when the lamp mirror is off the optical axis. A lamphouse that sits askew upon the lamp table cannot force its maximum output through the film aperture to hit the lens squarely.

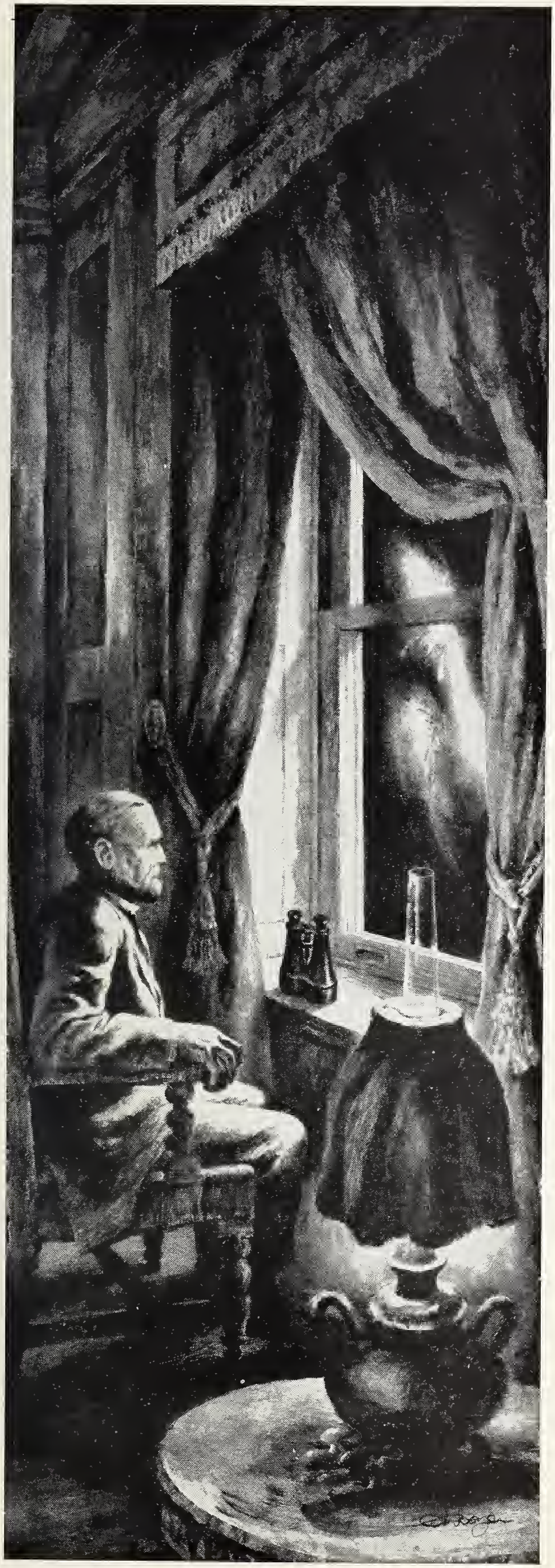
It isn't difficult to check the alignment of the mirror, the positive carbon guide, the center of the lamphouse cone, the film aperture, and the projection lens. If the lamphouse opens at the back, have an assistant shine a flashlight into the projection lens while you sight along the optical axis. If the lamphouse doesn't open up in the back, hold a pocket mirror diagonally in the lamphouse somewhere between the positive burner assembly and the mirror.

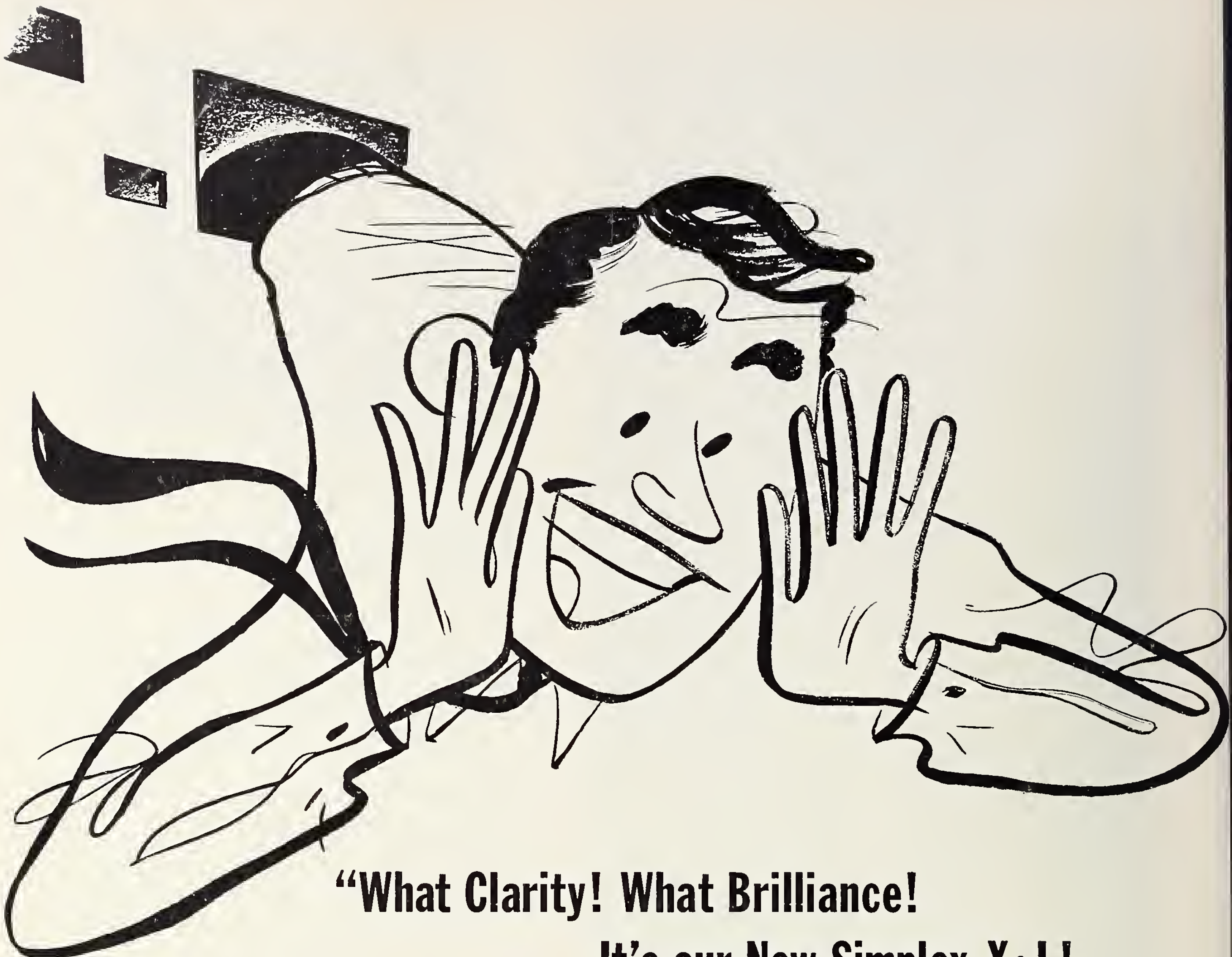
The "string test" with a dummy lens inserted into the mechanism lens-holder is indicated when simple sighting reveals one or more out-of-line components. Use of a long steel rod in place of a tightly stretched length of fishline is more difficult, but recommended by a few lamp manufacturers. If the lamphouse is crooked, loosen the bolts holding it to the table and move it so that its axis coincides with the optical axis of the picture mechanism. The job will become bothersome only if the lamphouse needs to be raised or lowered. The proper lamp supports or adaptors should be obtained beforehand; and at least two men are needed to do the job of moving heavy lamp equipment. Guard against accidents, particularly if the lamphouse is large enough to project over the end of the lamp table.

[THE END]

## TABLE A. "Simplified" HI Mirror-Lamp Data

| TRIM Pos. | TRIM Neg. | ARC AMPS. | ARC VOLTS | POSITIVE CONSUMP. (Inches/Hr.) | APPROXIMATE CRATER CANDLEPOWER | LUMENS PER WATT | TOTAL SCREEN LUMENS (Standard aperture, no shutter or filters, *f*:2.0 coated lens) *f*:2.5 lamp | L/W | *f*:2.0 lamp | L/W |
|---|---|---|---|---|---|---|---|---|---|---|
| *Suprex* 7 mm | 6 mm | 40 | 35 | 8 | 18,500 | 73 | 6,000 | 4.3 | 6,500 | 4.6 |
| 7 | 6 | 45 | 40 | 10 | 25,500 | 78 | 8,000 | 4.5 | 9,000 | 5.0 |
| 7 | 6 | 50 | 40 | 12 | 31,000 | 86 | 10,000 | 5.0 | 11,000 | 5.5 |
| *Suprex* 8 mm | 7 mm | 50 | 40 | 6 | 30,000 | 80 | 9,500 | 4.8 | 10,500 | 5.3 |
| 8 | 7 | 55 | 40 | 7 | 31,000 | 78 | 10,000 | 4.5 | 11,000 | 5.0 |
| 8 | 7 | 60 | 40 | 9 | 34,000 | 78 | 11,000 | 4.6 | 12,000 | 5.0 |
| 8 | 7 | 65 | 40 | 12 | 37,000 | 79 | 12,000 | 4.6 | 13,000 | 5.0 |
| 8 | 7 | 70 | 45 | 15 | 44,000 | 77 | 14,000 | 4.4 | 15,500 | 4.9 |
| *Suprex* 9 mm | 8 mm | 65 | 40 | 10 | 32,500 | 69 | 10,500 | 4.0 | 11,500 | 4.4 |
| 9 | 8 | 70 | 45 | 13 | 38,500 | 67 | 12,500 | 3.9 | 13,500 | 4.3 |
| 9 | 8 | 75 | 45 | 16 | 42,500 | 68 | 13,500 | 4.0 | 15,000 | 4.4 |
| 9 | 8 | 80 | 45 | 20 | 47,500 | 72 | 15,000 | 4.2 | 16,500 | 4.6 |
| 9 | 8 | 85 | 45 | 25 | 51,500 | 74 | 17,000 | 4.4 | 18,000 | 4.8 |





# INTERNATIONAL PROJECTIONIST



APRIL 1957

VOLUME 32 • NUMBER 4

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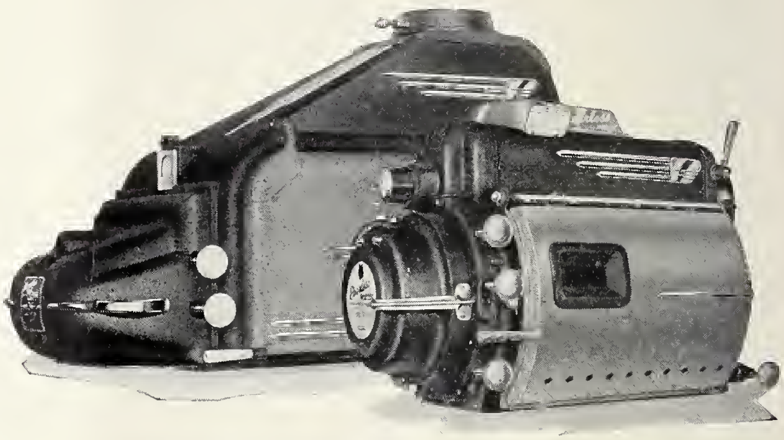

This lamp at 75-80 amperes produces as much and more light as any so called large reflector lamps, using 85-95 amperes, employing expensive heat filters and water cooling systems.

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**Volume 32** **APRIL 1957** **Number 4**

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## Monthly Chat

### This Is Getting Tiresome

"IF IT ISN'T on the film, we can't show it."

IP ran a story under that title back in July, 1946. Eleven years later and we must still reiterate it. The no-talent fringe is still with us . . . whenever the equipment is outmoded, the film bad, the light source pre-Edison, the throw excessively steep, the sound coming over like early Vitaphone—whose fault is it? Guess.

This passing-the-buck-to-the-projectionists routine has always been with us, and with the new processes has intensified. (We except those members of the industry who have been giving recognition to the projectionist as an experienced technician, and have taken steps to assist him with new problems.)

The major complaints, of course, are light and sound. Some dark screens are due to those black-and-white non-anamorphic projections where the aperture has to be considerably masked to get the wide-screen ratio that is demanded. And the result is not only a dark screen despite high amperages, but cropped heads and feet, titles gone from foreign films. And a good many of the so-called genre pictures ("Marty" comes to mind), excellent as they may be artistically, seemed to have been filmed with the shades drawn. On the other hand, some of the larger color productions have been filmed so light in sections as to make it impossible to keep a balance between intensities. That doesn't stop the complaints to the projectionist to hey, keep some light on the screen, will ya?

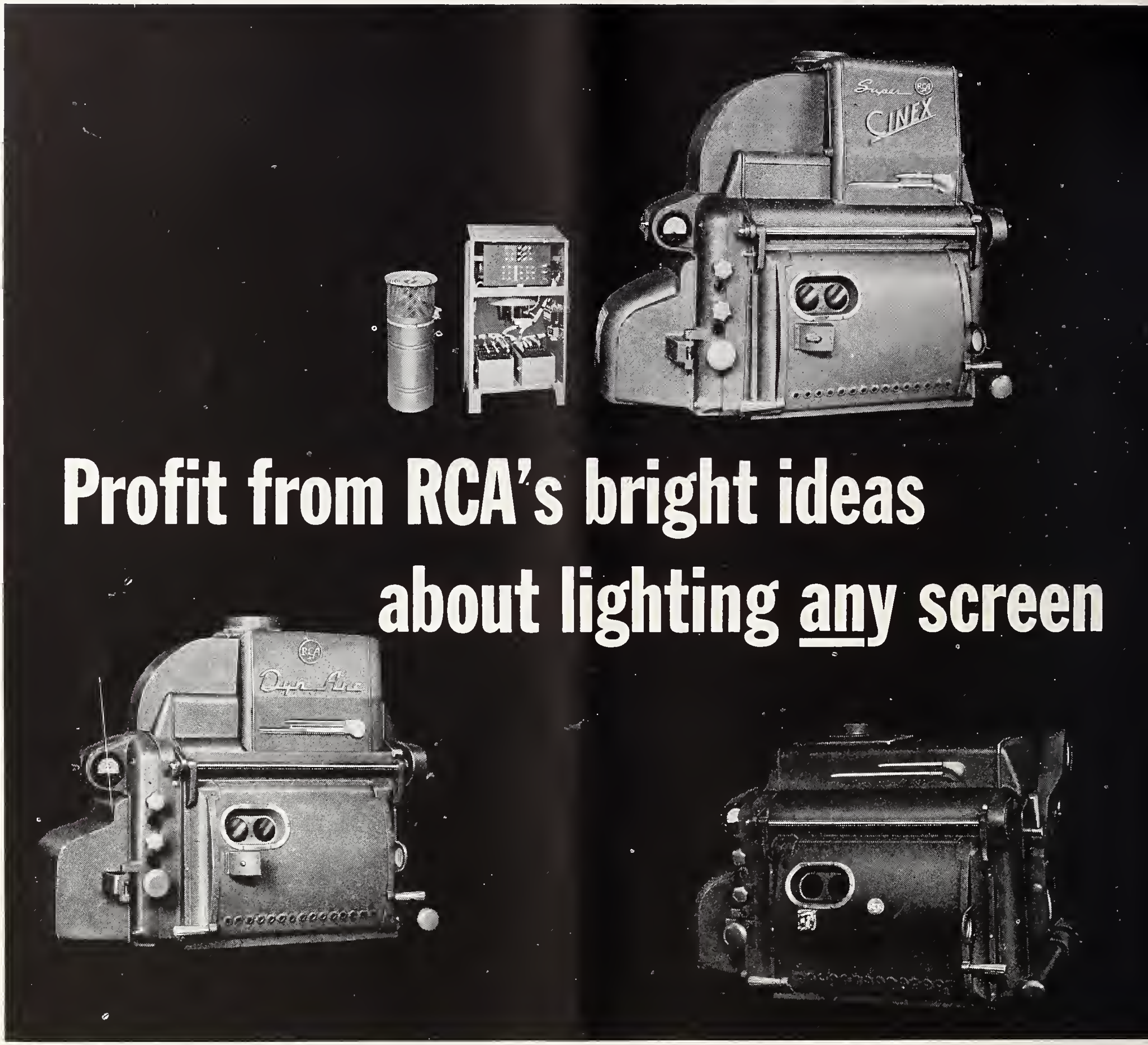
#### *"Giant's" Giant Sound Reproduction Headache*

When a picture like "Giant" is filmed in magnetic and released in optical, what are you going to do? Stay on the fader every minute? Projectionists in large first-run houses where such pictures will play for some weeks obtain a familiarity with scenes as they come up to develop a routine on the fader, but what about the house that plays the picture perhaps two—three times only? And, as in one theatre we know of, not a thing has been done in the penthouse heads since they were installed four years ago, and the magnetic clusters are worn so flat you don't even have to take them out of the reproducers to see the wear. No wonder sometimes in quiet moments the audience can hear some choice language issuing from the projection room.

Some houses have a throw of around 30 degrees, usually converted vaudes—or those that have deep stages (whatever happened to Bank Night?). This means a steep-angle balcony, and a consequent steep-angle throw, and good-bye sharp focus on top and bottom of the screen.

We borrow a phrase from one of the experts in the craft: "We licked 3D, CinemaScope, VistaVision, Todd-AO, and all the other new fangled ideas—and no time to learn. 'Here it is—now you show it.' And the projectionist made good."

For every crackpot or legit complaint, we could double with instances that showed that not only was the projectionist *not* at fault, but that he had suggested the correct solution. One thing for sure—when the exhibitor has an important technical problem on his mind, he isn't going to ask the popcorn machine.

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INTERNATIONAL PROJECTIONIST

Volume 32 APRIL 1957 Number 4

# Drive-In Projection: A Challenge

By ROBERT A. MITCHELL

**More and more drive-in theatres are being built, and it appears that the ozoner business is booming; but, technically speaking, there are still a number of problematic conditions to be faced.**

THE DRIVE-IN theatre testifies to the predominant role played by the automobile in modern civilization. We drive for recreation as well as from necessity; and now, thanks to the drive-in, we may enjoy movies without having to get out of our cars. And because drive-in theatres are designed for the admission and placement of automobiles, they are exclusively open-air theatres.

There is nothing new about open-air theatres, *per se*. The Greeks had them 25 centuries ago. And the presentation of motion pictures out of doors in the evening was not unusual even in the earliest days of the art. The movies didn't talk in those days, and open-air showings were perfumed, so to speak, by the subtle fragrance of new-mown grass, French cologne, and Havana cigars. The age of gasoline fumes had yet to arrive. And instead of comfortable auto seats, patrons endured hard wooden chairs to watch the galloping tintypes—and no necking!

### *Always New Problems*

The movies have come a long way since the films of Edison, the Lumières, and the immortal David Wark Griffith. But in many European towns, even today, motion pictures are shown out of doors in a similar atmosphere (i.e. no automobiles admitted). The soundtrack takes the place of "genuine marimba music played by native Hawaiians," of course, and action photographed in natural color and CinemaScope is uninterrupted by dialogue captions. Only in North America has the *drive-in* open-air theatre assumed the status of a major industry.

Practically non-existent before World War II, the drive-in theatre created a host of technical problems new to projectionists. The enormous size of drive-in screens makes demands upon the projector lamp equipment seldom encountered in indoor theatres; and stray light from various sources often erases the gigantic, but dim, picture from the screen. Then too, the use of extra-powerful arc lamps frequently subjects the film to more heat than it can withstand. Even when the photographic emulsion escapes destruction, the delicate ribbon of "frames" marching in single file past the blazing aperture "spot" flutters like a leaf in a gale. As we all know, sharp focus is then impossible.

These and other difficulties of drive-in projection are mitigated by the use of projection equipment built to work under high-heat conditions without wasting light or destroying the film. The job is too tough for archaic equipment. Old-style projectors, lenses, and lamps should never be used in a drive-in theatre.

The first requirement for a drive-in projection setup, therefore, is a pair of sturdy, dependable projectors fitted with modern optical soundheads and the most powerful high-intensity arc lamps that money can buy. (We must emphasize the word *high-intensity*, for in many parts of the world low-intensity arc lamps retain tremendous popularity for indoor theatres.) Heat-reducing accessories are also mandatory, as neither the picture mechanisms nor the film can escape damage without them when arc amperage climbs beyond 85 or 90 amperes.

Is there any sense in generating a lot of light only to waste it with old-fashioned lenses? Absolutely not! Optically rapid lenses and anamorphic attachments having cemented couplets and antireflection-coated glass-to-air surfaces are a "must." Optical speed should not be slower than $f$:1.7 for lenses or $f$:2.0 for lamps (an excellent combination which minimizes side fadeaway or "vignetting").

### *Sound System Complexities*

The drive-in sound system, more powerful and complex than an indoor system, requires careful thought. Power amplifiers should supply *at*

*least* $\frac{1}{4}$ watt of audio power per in-car speaker—a total of 250 watts for a 1,000-car theatre. Emergency amplifiers capable of powering at least one ramp should be provided, as well as a switching arrangement to permit the projectionist to check the sound in any ramp without having to step outside the projection building. And the speakers must be free from rattles at full volume, able to reproduce sound at medium volume without distortion, and built to withstand inclement weather and rough handling by the customers.

The reflective surface of the screen works hand in hand with the lamps and lenses to produce a projected picture of sufficient brightness to be viewed from all positions in the parking area without undue eyestrain. It is admittedly impossible to attain indoor-theatre brightness levels in any but the very smallest drive-ins, hence the use of any but the whitest screens and the biggest lamps is false economy. Let's see just how much light we can reasonably expect on a drive-in screen.

### Required Screen Brightness

The accompanying table reveals the number of screen lumens, measured with the projector shutter *not running*, required to illuminate white drive-in screens of about 0.8 reflectance. The values given assume the use of a standard Academy aperture *without* an anamorphic attachment, or an optical-track CinemaScope aperture *with* an anamorphic lens. It will be noted that, even with the most powerful arc lamps readily available today, it is impossible to obtain 4 footlamberts of luminance on matte screens wider than 70 feet, or 8 footlamberts on screens wider than 50 feet, or 10 footlamberts (the "quality" standard) on matte screens exceeding 45 feet in width.

Use of screens 100 or more feet in width necessarily results in a dim, dull-looking picture. As a matter of fact, light levels of only about 1 footlambert are obtained on 100-foot screens even with the most powerful of projection lamps. To obtain the indoor minimum of 10 footlamberts on a 150-foot white screen requires fully 420,000 lumens, or approximately 12 times more light than the most powerful 18-inch mirror lamp (13.6-mm positives burned at 165 amps., *f*:1.5 optics) is capable of producing!

One of the methods by which picture brightness is increased is the use of "aluminized" screens. Directional screens of this type are sometimes necessary, especially when the width of the picture exceeds 60 feet. Corrugated-plate aluminum screens are available to insure satisfactory light distribution throughout the parking area, but special aluminum screen paints having semi-diffusive properties do the same job. A forward tilt of the screen is practically mandatory with aluminized screens to avoid reflection of most of the light up into the sky. Neglect of this precaution may result in a dimmer picture with an aluminum screen than with a matte white screen!

White screens should always be used when the viewing area is so wide that the sight-line angle exceeds 25 degrees at the extreme ends of the ramps. Most drive-ins have a maximum viewing angle of 40 degrees.

The poor side-to-center distribution of screen illumination supplied by the more powerful reflector lamps burning positive carbons up to and including the 10-mm size is unfortunate. A distribution ratio of only 55% is *not* satisfactory. "Hot-spot" projection usually results in discolorations at the sides of the screen as well as in poor light. While a distribution of 100% is the desideratum, the indoor "quality standard" of 80% gives a pleasingly illuminated picture—a very important consideration in widescreen projection.

### 13.6-mm Carbon Advantages

Use of 13.6-mm carbons in reflector lamps at currents up to 165 amperes produces whiter, more evenly distributed light *provided that the magnifying power of the mirror is not decreased by auxiliary lenses.* The main advantage of the 13.6-mm carbon is its larger core area and resulting aperture spot of brighter, whiter, more evenly distributed light. A lens that decreases the magnifying power of the mirror, although giving about 10% more total light, counteracts the *quality* of illumination to be expected of a larger source.

The highest quality of brilliant screen light still requires the use of 13.6-mm condenser lamps burning up to 180 amperes. This type of lamp, when used with *f*:1.9 aspheric condensers and *f*:1.7 coated projection lenses, furnishes up to 25,000 screen lumens at a side-to-center distribution of 80%. Moreover, condenser lamps are entirely free from the vagaries of arc focus that plague all mirror-type lamps.

The performance of any arc lamp is at the mercy of its power supply, of course. When first costs, alone, are considered, rectifiers are the logical choice. In fact, modern selenium rectifier units are characterized by high electrical efficiency and dependability. But unless the power supplied by the AC mains is unusually free from voltage and power-factor variations, an

| WIDTH OF PICTURE IN FEET | PROJECTOR OUTPUT LUMENS FOR MATTE SCREEN OF 0.8 REFLECTANCE | | |
|---|---|---|---|
| | For 4 footlamberts (5 footcandles) | For 8 footlamberts (10 footcandles) | For 10 footlamberts (12½ footcandles) |
| 30 | 6,800 lumens | 14,000 lumens | 17,000 lumens |
| 35 | 9,000 | 18,000 | 23,000 |
| 40 | 12,000 | 24,000 | 30,000 |
| 45 | 15,000 | 30,000 | 38,000 |
| 50 | 19,000 | 38,000 | 47,000 |
| 55 | 23,000 | 45,000 | 57,000 |
| 60 | 27,000 | 54,000 | 68,000 |
| 65 | 32,000 | 63,000 | 79,000 |
| 70 | 37,000 | 74,000 | 92,000 |
| 75 | 42,000 | 84,000 | 110,000 |
| 80 | 48,000 | 96,000 | 120,000 |
| 85 | 54,000 | 110,000 | 140,000 |
| 90 | 61,000 | 120,000 | 150,000 |
| 95 | 68,000 | 140,000 | 170,000 |
| 100 | 75,000 | 150,000 | 190,000 |
| 110 | 91,000 | 180,000 | 230,000 |
| 120 | 110,000 | 220,000 | 270,000 |
| 130 | 130,000 | 250,000 | 320,000 |
| 140 | 150,000 | 290,000 | 370,000 |
| 150 | 170,000 | 340,000 | 420,000 |

The lumen values given in this table obtain when blank light is projected *without* the shutter running and when either a standard aperture (0.825" x 0.600") is used, or a CinemaScope aperture (0.839" x 0.715") with an anamorphic attachment. An anamorphic light loss of 15%—20% is assumed.

unwavering, flicker-free screen light can be obtained only by the use of motor-generator sets.

But whatever lamp is used, and whether it is powered by a rectifier or a motor-generator, the threefold heat problem demands the closest attention in drive-in projection.

The heat developed inside the lamphouse, itself, becomes increasingly serious as arc amperage is increased. Internal ventilation and ample exhaust facilities are required for the comfort of the projection crew and to minimize the breakage of glass mirrors. (Metal mirrors should not be used in drive-ins because they waste light and overheat the film.) Lamps not having internal ventilating systems require the most efficient gas-exhaust ventilation compatible with undisturbed burning of the arc.

The second effect of heat to be considered involves the projection mechanism. Not all of the radiation concentrated in the "spot" passes through the film aperture. A large amount of it—particularly when large-diameter positives are burned—is wasted upon the "cooling" and aperture plates and upon the blades of the rotating shutter. *All* absorbed radiation (visible, infrared, and ultraviolet) is converted into heat. If the amount of heat generated in the projector head is excessive, the film gate may be warped and the shutter bearings dried out.

Excessive heating of the mechanism is prevented by water-cooled baffles behind the aperture plate and by forced-draft ventilation provided by the rapidly revolving shutter.

### Film Heat Absorption

Heating of the film, itself, is the third and most important aspect of the heat problem. Calorie absorption by the film is minimized by water-cooled gates, inasmuch as film is heated largely by the *conduction* of thermal energy from the gate runners to the perforation margins. At worst, however, conducted heat only buckles the film and makes it brittle. The greatest film damage is caused, not by the "black heat" of conduction, but by the quite different process of direct irradiation.

The resistance of motion-picture film to the effects of intense arc irradiation is always a source of wonder. Nevertheless, there are limits beyond which the heat generated in the darker areas of the tiny photographic images unavoidably blisters the gelatine emulsion and destroys the print. Film is ordinarily spared complete destruction by the rapidity with which it moves and by the light-reducing effect of the rear shutter. We say "light" instead of "heat" because no heat appears until the radiation is absorbed. The emulsion may then be literally cooked by the energy-transfer process taking place inside it.

Film moves intermittently past the aperture at the rate of 24 frames per second. The rear shutter cuts off half the radiation and "flashes" each frame twice. There are thus two 1/96-second exposures to a beam of radiation so strong that it can ignite wood in less than a second. It is amazing, perhaps, that the film escapes serious damage until arc current is increased beyond the 80—90 ampere range.

Even somewhat below 80 or 90 amperes, buckling and rapid flutter of the radiation-bombarded film bring about difficulties in focusing. It is impossible to get a sharp picture on the screen when each frame moves in and out several times during its brief exposure. Above this current range, the emulsion of dense black-and-white prints blisters unless something is done to prevent it. Heat-reducing filters must be used.

### Infrared Radiation

About half the heat generated by the beam of a mirror arc comes from visible light, the other half from invisible, and therefore useless, infrared radiation. A heat filter removes the infrared without affecting the visible wavelengths. Actually, however, minus-infrared filters waste from 8% to 12% of the visible light and fail to remove all of the infrared rays. Tests demonstrate that the average good absorption-type filter removes 65% of the infrared—a 38% reduction in the *total* heat—and wastes 10% of the light. Use of such filters is optional at about 75 or 80 amperes (depending on the severity of film flutter) and mandatory at 85 or 90 amperes and above.

Experience has shown that mirror-type lamps burning 9-mm and 10-mm positives at their maximum rated currents actually produce more heat *at the center of the film frames* than do 12-mm and 13.6-mm carbons emitting even more total light. The smaller carbons give a markedly "peaked" light output at capacity current; and because of this fact, center-frame emulsion blistering and hot-spot screen illumination will be obtained with 9-mm and 10-mm positives in "fast" mirror lamps unless mirrors are used which permit an increase in working distance and greater magnification of the luminous crater. Heat filters can do nothing to improve a side-to-center light distribution of 50%, but they will protect the film and save the management from a staggering print-replacement bill.

### Absorption-Dichroic Filters

There are two distinctly different types of minus-infrared heat filter, the *absorption* type and the *dichroic*. Absorption filters *absorb* the infrared rays, while dichroic, or interference, filters *reflect* them. Both types of filter should be kept cool during use, but absorption filters require a forced-air draft to prevent their cracking. An "open" filter holder which allows the air to circulate freely over both sides of the filter is thereby desirable.

Minus-infrared heat filters should be cleaned before each performance. If kept free from dust and washed in mild soapy water when soiled, absorption filters will last indefinitely. Dichroic filters, on the other hand, have been known to deteriorate in a progressive manner, passing more of the infrared rays and blocking off more of the visible light. They should be

(*Continued on page* 29)

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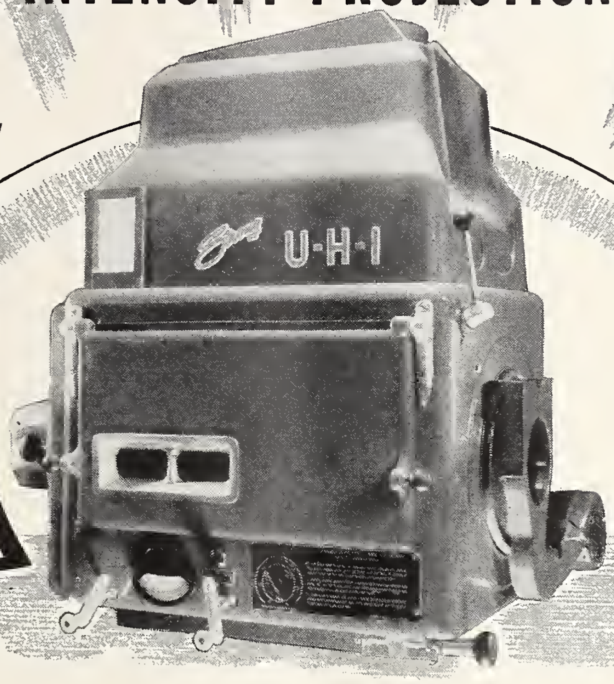


BEAM SHAPER LENS PROVIDED FOR USE WITH THE 13.6-MM TRIM LAMPS PATTERNS THE SPOT TO THE PARTICULAR SIZE AND SHAPE OF THE APERTURE SO AS TO EFFICIENTLY UTILIZE ALL USEFUL LIGHT. All other lamps, projecting a round spot, waste much light, particularly above and below the aperture. Using a 13.6-mm carbon trim, the overall optical speed is equivalent to *f*:1.5 when *f*:1.5/1.6 projection lenses are used and projectors are cleared for *f*:1.5.

EXPELLO BUILT-IN EXHAUST SYSTEM cools the rear of the reflector so as to permit the use of the newly developed "cold" reflectors which allow unwanted heat energy to pass through the mirror instead of being reflected to the aperture. The projected picture, accordingly, is not subject to the high degree of in-and-out of focus that distinguishes projection by most lamps operated at high currents. An air screen directs a thin layer of fast moving air upward over the surface of the reflector so as to cool it and keep soot and smoke from depositing thereon and a jet directed stream of high velocity air up and over the arc directs, stabilizes and conforms the flame away from the reflector, effect better combustion and prevents the formation of black soot. Heat radiation to the projection booth is held to a minimum by the heavy duty, quiet centrifugal exhaust fan which is driven by a separate motor. Heat and smoke are exhausted into a large, 8-inch, smoke pipe connection.

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**The inter-relationship of motion picture and TV work has brought a companion measurement to the decibel.**

# A Conversion Method for Db and Volume Units

By JOSEPH HOLT
Member, IA Local 428, Stockton, Calif.

SINCE the advent of sound to the accompaniment of motion pictures, projectionists have become familiar with the term "db" as a unit for the measurement of acoustical energy or potential. The expression db is a notation form for *decibel*, or one-tenth of a bel, so named in honor of the inventor of the telephone.

But in the fields of radio and television, another unit has come into general use. The shortened form of "VU" refers to Volume Units. VU and db co-exist with good reason for the continued use of each, and with the intertwining of motion picture work and telecasting, projectionists should be conversant with both, and able to handle simple problems of conversion.

The reader is urged to remain calm during the ensuing text, for a discussion of decibels of volume units must by definition deal with logarithms. Many projectionists shy away from "logs," and this is a pity in view of the ease with which problems may be handled.

### Decibel Definition

Let us then proceed to review the definition for decibels, and state verbally that the gain or loss in decibels is equal to ten times the logarithm of the number resulting from the division of one power level by the other where reference is to input and output powers. Stated in equation, this becomes:

$$db = 10 \log \frac{P2}{P1}$$

If voltages or currents are being dealt with, db difference equals *twenty* times the same quantity as the power equation; that is to say, with the voltage readings being substituted for power values.

Now the step from db to VU: merely erase db and write VU. The same equation applies without change.

The person newly introduced to this identical condition is apt to conclude there is no difference at all, since the same expression applies both to db and VU values.

The difference lies in the primary definition of what must prevail at zero level. The concept of zero db includes a measurable power level. This must be distinguished from *zero signal*, which actually should be termed minus infinity db. This means that signal attenuation is to the infinite or maximum quantity.

But with the understanding that O db is set by standard at that condition in which a power of .006 watt (6 milliwatts) is present across a load impedance of 500 ohms, we may examine the definition for O VU and note it provides for .001 watt (1 milliwatt) in 600 ohms.

### O db Power Level

Using Ohm's equation, $E^2 = RP$, we substitute 500 ohms and .006 watt, and find that $E^2 = 3.0$ volts. The root of 3 is 1.732 volts, and we now know that if we measure 1.732 volts in a load of 500 ohms, a power level of O db exists. Using the same procedure and the appropriate values, we learn that O VU produces 0.775 volt in 600 ohms.

But what, the reader is sure to ask, if the load impedance does not equal exactly 500 or 600 ohms? The obvious answer is that the db or VU reading cannot be the value which is indicated by the meter. Correction factors are computed by use of the equation.

$$+ db = 10 \log \frac{500}{Z \text{ line}}$$

when Z line is less than 500 ohms. This simply means that in the case of a 16 ohm load, we apply the relation as stated:

$$+ db = 10 \log \frac{500}{16}$$

The log of the quotient of 500 divided by 16 is 1.49, and when it is multiplied by 10, we obtain a correction factor of 14.9 db which must be added to a db meter connected across 16 ohms in order to read absolute power level.

Given a power level, we may make use of the power equation to determine the Units difference.

$$\text{Diff.} = 10 \log \frac{db}{VU}$$

$$\text{and} \quad \text{Diff} = 10 \log \frac{.006}{.001}$$

Solving, 10 times log of 6 is equal to 10 times .778, which tells us that we add 7.78 units to a db power level in order to learn VU power level, and subtract from VU readings the same amount in order to convert to decibels.

### Correction Factors

For convenience, we may now compute selected values for correction factors both db and VU. (See Table below.)

Further usefulness of the information we have covered in this article is indicated by a reference to a common problem. Let it be assumed that a device with output impedance of 500 ohms is coupled to a line of 250

(*Continued on page* 28)

| Db Correction | Line Impedance (Ohms) | VU Correction |
|---|---|---|
| +16.99 | 10 | +17.78 |
| +14.94 | 16 | +15.74 |
| + 8.53 | 70 | + 9.33 |
| + 5.22 | 150 | + 6.02 |
| + 2.22 | 300 | + 3.01 |
| 0. | 500 | + .78 |
| — 1.76 | 750 | — .90 |
| — 3.01 | 1000 | — 2.22 |
| — 4.77 | 1500 | — 3.98 |

**This spring in Bartlesville, Oklahoma, an experiment in piping motion pictures into private homes via TV cable will be tried—and so far it has caused a small furor.**

# Is It Going To Be Cable Theatre?

## FOR

LAST FALL, almost unobtrusively, a proposed solution to the exhibitor's Problem Number One put a hesitant foot through the door. In a town most theatremen had never heard of, Bartlesville, Oklahoma, a cable theatre was being erected. And what, those interested asked, was a cable theatre?

In principle, it is simple. Originating from a regularly projected 35-mm film, an image is sent out on special sending equipment, then on a coaxial cable strung on telephone and light poles, then off the cable by special lead-in wires to private home TV sets, through an off channel that is not in use by a regular TV station. The pictures would be first-run features, shown continuously through the day, affording the viewer the best in motion picture entertainment in the comfort of his home, and, it might be added, without the irritating interruptions of commercials. For this service the subscriber paid a monthly rate—in the Bartlesville experiment, $9.50 a month.

This pilot project is called Tele-Movies, and was underwritten by a hustling southwest theatre chain, Video Independent Theatres, Inc., which also owns other houses and drive-ins in the area. The cable system was developed by Jerrold Electronics Mfg. Corp. of Philadelphia, and the Public Service Co. of Oklahoma, along with Southwestern Bell Telephone Co. were negotiated with to supply communications. When preliminary installations were made, National Theatre Supply furnished the projection equipment which was developed by General Precision Laboratory.

### *Intensive Advertising*

That was the background, if anyone cared to read about it, and it has become obvious that quite a few people in the industry have cared. Video Independent Theatres, under the guidance of its very able president, Henry Griffing, embarked on an intensive advertising campaign. Takeoff point was the convention of the United Theatre Owners of Oklahoma, where Griffing invited exhibitors everywhere to take part in the development of telemovies, "the hope for the future of the motion picture business."

Griffing cleared up some misconceptions: "The biggest mistaken idea is that we're involved in some kind of subscription television. We are still in the motion picture business. This is *not* toll TV but TM-telemovies, made by motion picture producers and shown by motion picture exhibitors.

"As a matter of fact, TM is the best weapon the exhibitor has to fight toll TV and restore the audience we

(*Continued on page* 22)

## AGAINST

THERE ARE certain members of the motion picture industry that refuse to subscribe to the if-you-can't-fight-'em-join-'em philosophy, and that, they consider, is what telemovies is out to do. There is a strong feeling among TM's opponents that it is a foolish and wasteful move to clasp hands with TV at this particular point—this particular point being that movies, more or less because of increased excellence of quality, have enjoyed an upswing of business in the last six months, and TV, admittedly, has had a dull year. Why quit when you're winning?

Many opponents of telemovies are sitting by waiting to see the outcome of the Federal Communications Commission's decision on toll-TV. One of the jaundiced-eye viewers is Matty Fox, president of Skiatron-TV, who has warned exhibitors thusly: ". . . they're going to find out what huge kind of investment is required to do this thing properly. The way the theatres are talking, wire systems are going to be had for a dime not long after they get started. It's no good to look at this whole proposition as just an extension of the theatre seat."

Skiatron is one of the originals in the toll-TV field, and has also taken test flights into the cable theatre system, where as yet there is no monopoly on who uses whose cable. Fox also thinks that competitors of Paramount would be most unlikely to supply product for the Paramount-owned Telemeter coin-box system that was initiated last month in Los Angeles.

### *Small Theatre Casualties*

One strong point that Fox stressed was that telemovies would not be a profitable venture except in "closed" situations where all the theatres in an area were owned by one individual or firm. In a situation where there are a number of competing houses it would be, as one distributor sales executive put it, a "nightmare." And the margin theatres would be sure to go down.

Even among those distributors who have an open mind about cable theatre, the by-word is caution. Most large outfits are waiting to see the outcome of the Bartlesville operation, and in more than one quarter there is pessimism about that outcome. Among those on the nay side, the feeling is that the exhibitor who embraces cable theatre is slitting his own throat, not to mention the competitor down the block who might not have a TM installation. In a metropolis the size of New York City, there is some opinion that cable theatre is not possible because in areas where there is a good deal of competition—which is the case for the majority of the metropolitan area—there could be no feasible breaking down of zones.

(*Continued on page* 22)

# NTS's Telemovies Projection Equipment

By ROBERT MacLEOD

**Projectionists may find themselves in somewhat strange surroundings in the future if the telemovie experiment proves itself; NTS provides a description of equipment.**

PROJECTIONISTS who have wondered just what their part would be in the recent trend to wire home movies via TV cable have, at least, an equipment answer in the present installations at Bartlesville, Oklahoma, where the initial experiment in telemovies is being conducted. National Theatre Supply Co. has announced that it has just completed negotiations to furnish the projection equipment for that operation; the technical set-up being developed by General Precision Laboratory is now in its final stages preparatory to installation.

The projection installation is much the same type that is now being used by those TV networks operating on 35-mm film. Video Independent Theatres, backers and instigators of telemovies, "are insisting that the quality of their signal on the cable be the best that can be obtained," as well it might, considering that the equipment installed is of the newest type.

### Change In Plans

A change in plans for the telemovie experiment has been made, in that now arrangements have been made to supply the viewer with a choice of two motion pictures, instead of the aforeplanned one-shot. There will also be a third channel to furnish subscribers with continuous news and weather reports.

An innovation on this third channel will be that the weather and news reports will be in a visual form with the patrons being able to watch the messages which are typed out on a moving tape. The sound on this third channel will be in the form of continuous background music. The one coaxial cable that is being installed will take several channels of programs on different frequencies.

Interviewed by IP, John Servies, vice-president of NTS, stated that the GPL plant is now manufacturing and assembling the equipment, which should be ready for installation around the first of May. That equipment will include the following:

- 2 PA200 Telecast Projectors
- 1 PA505 Vidicon Film Chain
- 1 PA606 Master Monitor and Console
- 1 PA604C Sync Generator
- 1 PA510 and 511 Special Multiplexing System with two-way camera mount
- 1 Telejector Slide Projector and Pedestal
- 1 PD150 Standby Camera Chain
- 1 200 Bar and Dot Generator
- 1 Film Variable Gain Control
- 1 lot of cables, lenses, racks, etc.

### Modified Simplex XL's

As explained to IP by Servies, the projectors are very special modified Simplex XL's. Admittedly more expensive, noisier, and less efficient from a light transmission standpoint than theatre projectors, these special projectors employ a 2-3 movement. These detractions, however, are considered absolutely necessary, because for TV the 24 frame/48 image show must be adapted to the TV requirement of 30 frame/60 image. The GPL special movement exposes the first frame two times, the second frame three times, the third two, the fourth three, and on down the pike. In other words, in 24 frames there are 60 exposures necessary for TV.

### Separate Shutter Motor

The specialized projectors also have a number of other features including a separate motor for the shutter in sync with the drive motor which allows threading up by the projectionist, and actual control by the man at the monitor. NTS notes that this is the same kind used by major TV networks.

Quoting Servies' announcement: "The PA505 Camera Chain is of studio quality. The emergency standby chain is furnished for low cost standby use, and will only function when service is needed on the DeLuxe System. (*The DeLuxe System features accessories such as camera cable, multiplexing mirror system with pedestal, field lens*

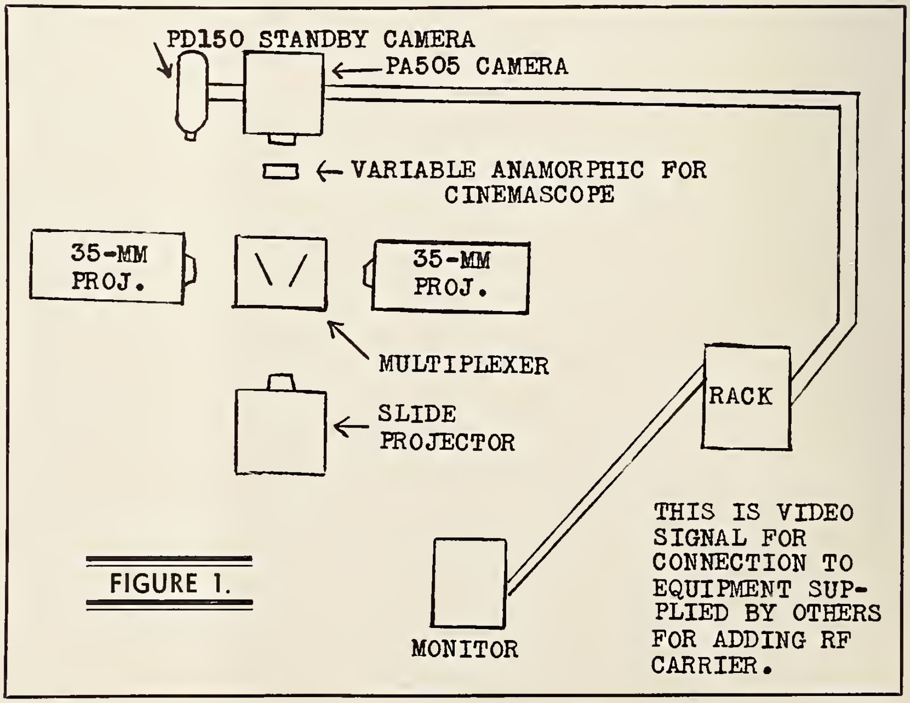



FIGURE 1.

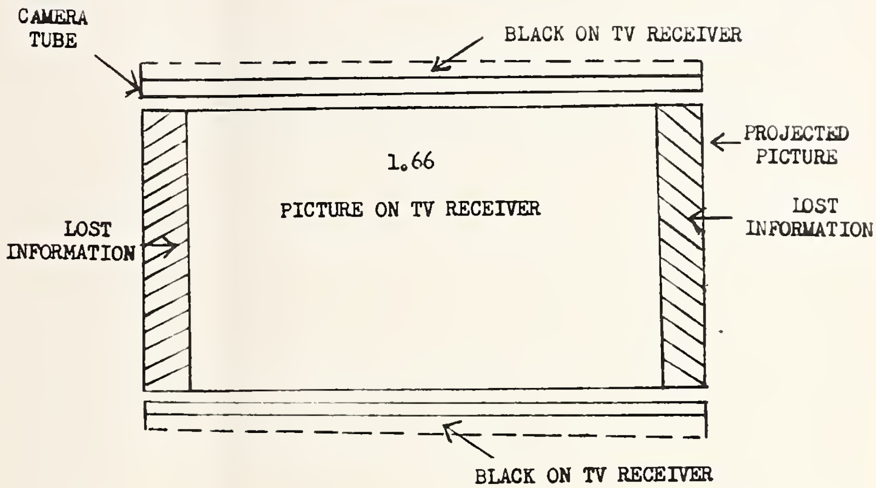
*and pedestal assembly, a master monitor, telejector, selectroslide projector, etc.—ED.*)

"Installation supervision by GPL engineers is included. All wiring should be done in trenches in the floor 4 to 8 inches deep. These are usually covered with steel plates, and make for much easier servicing than the use of conduit."

The PA200 projector is designed for use with 3-vidicon color or black-and-white studio film chains, embodying the well-known Simplex projector mechanism and soundhead. General Precision Lab has claimed these features for it:

1. Resolution in excess of 600 lines throughout field. Corner illumination not less than 90% of that at center.
2. Jump and weave less than 0.15% of picture width.
3. 2-3 intermittent with 40% application time for three-vidicon or single vidicon operation.
4. Relay condensing system for field lens or direct-in operation. Provision is made for filters.
5. Separate shutter motor permits still-frame operation.
6. Sturdy Geneva-type intermittent movement operating in oil bath.
7. Magazine film capacity up to 5400 feet. Film path totally enclosed. Sighting windows for viewing during operation.
8. Built-in provision for local or remote operation and changeover. External relay control voltage is 24 v. DC.
9. Elapsed time meter to show lamp running time.
10. Reduced standby lamp voltage, calculated to eliminate thermal shock and provide longer lamp life. Built-in voltmeter and Variac to permit varying lamp voltage +10 v. to –15 v. from line voltage.
11. Projection lamp 750 or 1000 watts that burns base up and designed to remain correctly aligned. Dual lamp system, and provisions for quick change.
12. Film gate trap and optical components easily removed for cleaning.
13. Tension of film trap is adjustable. Trap is spring-loaded and located at aperture.
14. Projector levelling screws.
15. Standard Simplex sound system meeting standard motion picture sound specifications.
    (a) Frequency response 50 to 8000 cycles.
    (b) Flutter is stated less than 0.15%
    (c) Sound stabilized within 3 seconds after start.
    (d) Output level is 60 mw. into 500 ohms, balanced output. Impedance may be set for 600/500, 333, 250/200, 150/125, and 50 ohms.

FIGURE 2.




    (e) Gain of preamp adjustable for equalization ± 5 db.
    (f) Two exciter lamps in soundhead for quick change.
    (g) Exciter lamp voltage (DC) stabilized to compensate for line variations.

The equipment layout can best be explained by the accompanying diagram (Fig. 1).

### *CinemaScope Problem*

A projectionist's natural question would be: what about CinemaScope? Since this service has proclaimed that it will highlight first-run features, the factor that CinemaScope product will constitute a large portion of the distribution would naturally concern technicians. GPL is ready to admit that converting a 2.35/1 aspect ratio to the TV receiver (which is the standard 1.33/1) is "quite a problem." But it is also assuring telemovie adherents that they have come up with a satisfactory solution. This is accomplished by squeezing slightly with a variable anamorphic lens, and cropping slightly by the way the picture is placed on the TV camera tube.

A standard 2.35/1 (.715 x .839 inches) aperture plate gets that ratio if the variable anamorphic is set at a 2 to 1 expansion ratio. In the telemovie case, the variable anamorphic is set to squeeze the image slightly (2/1), and when the image appears on the TV screen, it will have a 1.66/1 ratio. Technicians involved consider that the lost information is negligible —more of the shape of a standard movie. See Fig. 2.

Although VIT feels that operations in a town of less than 15,000 population would be unprofitable, the firm considers that in small towns that have an adequate community antenna set up (providing also the necessary availability of facilities), the system might be practical. Not blocking any regular-channel TV signals, the telemovie signal would be placed on the same cable and channelled only into the homes of TM's subscribers. This could be accomplished by putting a filter outside the home of a non-subscriber, not interfering with his regular TV.

Whatever the pros and cons (and that is discussed elsewhere on IP's pages), the Bartlesville experiment—although still in the future — has already made its inroads into the technical know-how of major equipment manufacturers. What inroads it will make into the technical know-how of projectionists remains to be seen.

To quote Servies: "Our company is anxious, at any time, to help promote any idea that might help increase motion picture theatre box office. We are dedicated to do as much as we can to make this test at Bartlesville a success."

## Kodak's $35,500,000 Dividend

Some 50,800 employees of Eastman Kodak shared a $35,500,000 wage dividend last month. The sum is the largest in the history of the wage dividend plan which was initiated in 1912. Eligible persons will receive $31.75 for each $1000 earned during the five years 1952-56.

**The function of this department is to provide a forum for the exchange of news and views relative to individual and group activities by members of the organized projectionist craft and its affiliates. Contributions relative to technical and social phases of craft activity are invited.**

# *In The* SPOTLIGHT

AN INTERNATIONAL secretariat, "International Entertainment Workers," made up of global theatre labor unions, has been tentatively set up in Geneva, Switzerland. The IEW will come under the International Confederation of Free Trade Unions, a Belgium-based organization.

Goal of the International is (1) to set up world-wide exchange of union data, and (2) a cooperative exchange of favors, unfair lists, etc. IEW will operate on its own money, but it will be representing the craft workers.

To quote the group's credo, the purpose is "to protect performers' economic and social interests, and promote the anti-totalitarian principles of the Confederation." Said principles have been given a boost since the European theatrical unions soured on the Reds after the Hungarian debacle. The IEW is not having any of the right wing, either, as dictatorships of Spain, Portugal, Dominican Republic, etc., are not eligible for membership.

### *IATSE Support Sought*

The secretariat's immediate step seems to be an active wooing of union support in this country, and according to a recent trade paper report the IATSE is already "pretty well committed." After the unions are in (and right now on paper membership numbers 750,000 workers in 10 countries), the next step is a "founding congress" to be convened in about six months. If all goes well the International Entertainment Workers will emerge from the constitutional convention a reality.

The anti-Commie emphasis is, of course, based on the fact that in the theatrical world pro-Soviets can get to be thick as thieves—if thieves is not too soft a designation. Up until the Hungarian rebel became Man of the Year, the studio crews abroad—particularly in France and Italy—were overrun with Soviet sympathizers. But the great disillusionment has set in since the Russians made the mistake of shooting up some craft workers. But mere disillusionment is not going to stop the Reds from trying to recruit members from the theatrical worker ranks — and there are always the easily swayed. Americans, by and large, are not too readily sold, since —let's face it—we all want to make a dollar. But a sick and tired Europe has at times been somewhat easy prey. The IEW wants to stop that.

But, like every other initial venture, it will be no bed of roses. *Variety*, industry trade-paper, asked some pertinent questions last month (although it is not to be misconstrued that the publication is anywhere near being against the idea): Which craft unions are anxious to organize internationally? What would be the currency takeout in various frozen countries? How would the occasional problem of international stranding of talent and technicians be solved? Difficulties in negotiating work permits in some countries? How to solve the problem of non-uniformity of practice from country to country as regards income tax, severance pay, and social security?

At this writing, AFL-CIO travelling envoy Irving Brown has become a member of the International Entertainment Workers, and it will be interesting to see the outcome.

• The New York State Association of Motion Picture Projectionists will hold its 1957 Spring meeting May 6 at the American Legion Home in Geneva, N. Y. The conference will open at 1:30 p. m. A buffet dinner will be served at 6 p. m. to be followed by a midnight banquet and entertainment. Host Local 108, Geneva, promises a gala evening for the delegates and guests.

• We extend our sympathy to Stanley Creech, member of Vancouver Local 348, on the recent death of his father. During World War II while serving as an officer of the Canadian Navy, Stanley Creech visited the offices of IP whenever his ship docked in New York, and the late conductor of these columns, Harry Sherman, and yours truly spent many a pleasant hour in his company.

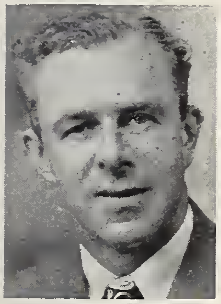
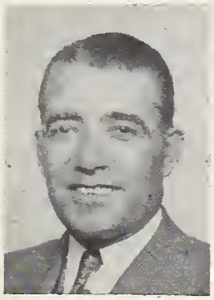
• The Winnipeg (Canada) Labor Institute recently sponsored a two-day course on labor educational affairs. Labor groups in that city were invited to send representatives to attend the classes. E. L.

## VANCOUVER LOCAL 348 PAYS TRIBUTE TO VETERAN MEMBERS

Gold life membership cards were recently presented to 40-year members in Vancouver Local 348. The presentations were made by Orin M. Jacobson, IA 4th vice-president, acting on behalf of the Local. Shown here are the recipients of the awards, front row, left to right: W. Woolridge, F. G. Graham, S. B. Ellerington, and E. B. Marshall. Center, left to right: R. Hansom, A. Corriveau, R. G. Pollock, Jacobson, and J. R. Foster. Back row: E. G. McMillan, J. W. Roberts, and W. A. Crute. Also honored but not shown in the above picture were M. H. Thoreau and C. L. Kerr.

Barr and Lawrence Hackie, who were chosen to represent IA Local 299, were very much impressed with the project and in their report to the Local strongly urged that it be represented at these classes whenever they are held.

• More than 330 union delegates and guests attended the recent installation ceremonies of the Westchester Federation of Labor. Lawrence A. Sabatino, charter member of IA Local 650, Westchester County, N. Y., was re-elected financial-secretary of the Federation for a third term; and Michael J. Nugent, recording and corresponding secretary for Local 650, was also re-elected for a third term as trustee.

Michael J. Nugent     Lawrence Sabatino

Nugent, incidentally, is active not only in labor circles but in civic affairs. He was recently elected vice-mayor of Yonkers (N. Y.), and has served as councilman for eight years. Although Nugent was designated about a year ago for the office of vice-mayor by the Democratic City Committee, the election was held up until February of this year by a so-called "insurgent" group within the party. However, the deadlock was broken several months ago and Nugent was chosen for the office. In addition to his union and civic duties, he has been acting president of the Yonkers Community Chest for the past year.

• The Midland Salon of Photography will hold its 27th annual exhibition in the Art Gallery at Dudley, Worcestershire, England, from June 15 to July 13, 1957. Photographers everywhere are invited to take part in this exhibition. All entries must be in by May 17; applications for entry forms may be obtained by writing to: George Vernon Billson, "Grey Gables," 27, Thurnview Rd., Leicester, England.

• The sunny skies of Florida lured another Northerner to its balmy shores. Maurice Moriarity, longtime member of Local 273, New Haven, Conn., retired and he and Mrs. Moriarity are now making their home in Florida. A projectionist for more than 40 years, Moriarity worked at the Paramount Theatre in New Haven for the past 30 years.

# News and Views from District No. 2

*By* **HANK BOLDIZSAR**

**Member, IA Local 150, Los Angeles, Calif.**

*With this issue we welcome to our "Spotlight" department a new feature contributed by a well-known West Coast projectionist and columnist.*

Upon acceptance of IP's invitation to conduct a monthly "chatty" column dealing with various West Coast personalities in the projection craft and with craft activities, I appeared before the members of my Local's Executive Board and discussed the venture with them. After "kicking the ball" around a bit, George Schaffer, our business representative, suggested that I broaden my sphere of activity and instead of confining my comments to California Locals, that I cover all the Locals in District No. 2 which comprises the states of Nevada, Arizona, and California. The suggestion was accepted and in a moment of weakness I came up with the title that heads this department. This piece of business settled, I quickly took my leave of the Board before anybody could protest.

Brother craftsmen, members of Locals in District No. 2 (and elsewhere, too, for that matter) are invited to drop me a line and let me know what's percolating in their neck of the woods. I hang my shingle at 404 Holger Drive, Montebello, Calif.

I'll tee off with a report on the recent District No. 2 Council meeting, which was held at the Melody Lane Restaurant in Beverly Hills. The Council, incidentally, consists of 24 theatrical Locals affiliated with the IA. Council President Billy Wise (San Diego Local 297) presided at the meeting, and was assisted by Lon Bennett (Long Beach Local 521), Council secretary. Steve Newman, retired IA representative and gold card member of Los Angeles Local 33, planed in from San Francisco and addressed the delegates on the progress made by District Locals on health, welfare and pension plans. Other speakers followed, all of whom received a warm welcome.

At the close of the business sessions, host Local 150 tendered a dinner to the entire assembly. Brother George Schaffer arranged for special showings for the delegates and guests of the Todd AO feature "Around the World in 80 Days." Through the courtesy of Michael Todd and his director of theatres, Michael J. Kavanagh, Brother Schaffer arranged for two showings on the day of the meeting—one was held at noon and the other at 1 a.m., following the evening's festivities.

### *Local 150 Member Honored*

A highlight of the evening was the award of a gold life membership card to Brother Joe Pylet, an active member of Local 150 for the past 45 years. Joe has held practically every office in the Local, serving at various times as president, secretary, business representative, and as member of the Executive Board. He has helped guide the growth of the Local from a membership of 22 in 1912 to its present roster of more than 625.

Joe Pylet began his career as a motion picture projectionist back in 1904.

**LOS ANGELES LOCAL 150 HONORS VETERAN PROJECTIONIST**

Wallace G. Crowley (second from right), president of Local 150, presents honorary gold life membership card to Joe Pylet, active member for the past 45 years. Shown here are Local 150 officials beaming approval of the award—left to right: Al Adams, executive board; George Schaeffer, business representative; Pylet; Ted Pylet (son of recipient); Crowley, and Charles Crowe, secretary-treasurer.

when, at the age of 17, he operated "magic lanterns" at the Old Grand Theatre in Milwaukee, Wis. Two years later he toured the eastern states with the Royal Vaudeville Troupe, working as a projectionist. In 1908 he went to Chicago, where he joined the Chicago Moving Picture and Projecting Machine Operators Protective Union Branch No. 8, an IA affiliate, which later became known as the Chicago Moving Picture Machine Operators Local 145—today identified as Local 110. He moved to California in 1911, transferring his membership to the Los Angeles Local in 1912.

After 53 years devotion to the craft he enjoyed and helped build, Joe is retiring and he and Mrs. Pylet, married 47 years, plan to spend some time in traveling—a long cherished dream. Joe also looks forward to enjoying his favorite sport—golf—with his favorite partner, son Ted, a member of Local 150 since 1940.

### *Stop, Look and Listen*

Now that summer is in the offing and vacations will soon be due, I suppose there are many projectionists throughout the country who are thinking of getting out the old family flivver for the long haul to sunny California. A word of advice to my brother-projectionists—if you are contemplating pulling up roots and transplanting yourselves out here on the Coast, you had better give the matter very serious thought. Getting started out here in our particular field of endeavor is a very discouraging task these days. Studio gates are NOT wide open and there is no shortage of theatre projectionists. Our waiting list of job hopefuls would reach from here to where you are. Before making the move, I would suggest that you investigate all the possibilities for failure as well as success, and take stock of your financial reserves.

Our worthy brother craftsman, W. R. "Slim" Hermance this month celebrates 40 years of active membership in Local 150. April seems to be the month of celebrations for Slim since it marks 29 years with the Fox West Coast Theatres, 15 years at the Fox Beverly, and 20 years as a member of the Los Angeles County Examining Board for motion picture projectionist licenses. A fine record of service to his Local and his community.

To Boris Medove goes the credit for initiating the copper drippings saving program in the Local for the benefit of the Will Rogers Memorial Hospital at Saranac Lake, N. Y. The project was greeted with enthusiasm by the members. Art Minjares, our "Chihuahua Kced" and Nels Matheson made an immediate donation of more than 100 pounds of copper drippings. With the program off to a flying start, we hope that

(*Continued on page* 28)

# Projectionist License Exam Questions

A BRUSH-UP is always good policy for any projectionist, whether he be vet or apprentice. Since IP has received a number of queries on the subject, we present below some typical questions from various official motion picture projectionist license examinations. A passing mark is 75%, and to check yourself, you will find the correct answers on Page 25.

*1. Arc lamp houses may be constructed of sheet metal of at least:*

(a) 20 U. S. gauge; (b) 22 U. S. gauge; (c) 24 U. S. gauge; (d) 26 U. S. gauge.

*2. The smallest size of wire which may be used to supply electricity to the projector outlet is:*

(a) #2 B & S; (b) #4 B & S; (c) #6 B & S, (d) #8 B & S.

*3. In connecting the electric leads to the terminals of the arc, you should use:*

(a) solderless connectors; (b) bakelite binding posts; (c) solder lugs; (d) no lugs at all, just twist the wire.

*4. The appropriate volt drop across the arc is:*

(a) 20 to 100 volts; (b) 100 to 200 volts; (c) 200 to 500 volts, (d) above 500 volts.

*5. Testing for a positive wire on a single-phase line:*

(a) can be done by a voltmeter; (b) can be done by a polarity indicator; (c) can be done by litmus paper, (d) cannot be done.

*6. In the construction of magazines, you are not permitted to use:*

(a) solder; (b) lock-washers; (c) Parker-Kalon screws, (d) machine screws and nuts.

*7. In the schematic wiring diagram of a tungar charger (Fig. 1), "B" represents the:*

(a) transformer; (b) tungar tube; (c) pilot light, (d) choke.

*8. In the schematic wiring diagram of a tungar charger (Fig. 1), "A" represents the:*

(a) transformer; (b) tungar tube; (c) pilot light, (d) choke.

*9. The area of the vent pipes in the projection room shall not be less than:*

(a) 100 sq. in.; (b) 20 sq. in.; (c) 50 sq. in., (d) 78 sq. in.

*10. The purpose of the "free" loops in the soundhead is:*

(a) to keep the film from binding; (b) to prevent the jerking of the intermittent from breaking the film; (c) to prevent vibrations from the intermittent from being transmitted through the film to the point where the exciter lamp illuminates the soundtrack; (d) to prevent vibrations of the picture on the screen.

*11. The draft in the vent pipe shall be maintained by an exhaust fan having a capacity of at least:*

(a) 50 cu. ft. per minute; (b) 25 cu. ft. per minute; (c) 50 cu. ft. per hour, (d) 25 cu. ft. per hour.

*12. Sometimes during a showing the film sticks in the projector, and may occasionally bind and even break. Which of the following should be done:*

(a) the gate and other parts of the machine should be cleaned of emulsion and dirt; (b) the surface of the film should be lubricated; (c) the gate tension should be increased, (d) the mechanism should be adjusted to run slower.

*13. If the film still binds and breaks, where else would you look for the cause?*

(a) in the photoelectric cell; (b) in the operation of the arc; (c) in worn sprocket teeth, (d) in the amplifier.

*14. The electric motor drives for the exhaust fan which pulls the air out of the projection room shall be connected to:*

(a) "house lights" circuit; (b) arc

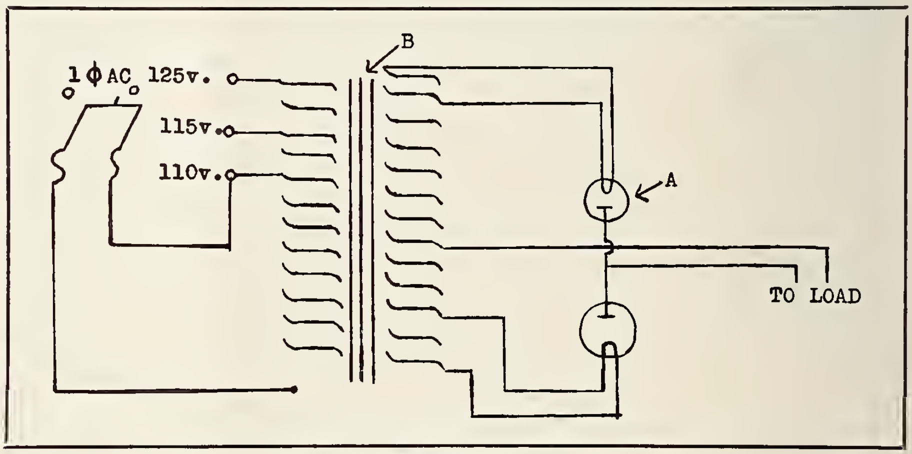



**FIGURE 1.**

light circuit; (c) stage light circuit, (d) emergency service.

*15. Which of the following liquids gives off toxic vapors under ordinary conditions of use?*

(a) collodion or acetone; (b) cellulose acetate; (c) cellulose nitrate, (d) carbon tetrachloride.

*16. The longest length of film which may be exposed while rewinding is:*

(a) 2 ft.; (b) 3 ft.; (c) 5 ft., (d) 6 ft.

*17. The process to determine the circular mil area of a piece of stranded wire would be to:*

(a) find the area of each strand, divide it by 1,000 and multiply the answer by the number of strands; (b) find the circular mil area of one strand and multiply by the number of strands; (c) multiply the circular mil foot resistance by the number of strands, (d) square the area of the whole wire and divide by the number of strands.

*18. When the loop is "lost":*

(a) the picture is blurred; (b) the sound and picture go out of synchronism; (c) the sound is indistinct. (d) the film breaks.

*19. If your monitor speaker is reproducing the sound on the film properly, and yet the loudspeakers on the stage are dead, the trouble would be located:*

(a) between the soundhead and the amplifier; (b) in the soundhead; (c) between the monitor and the stage speakers; (d) between the amplifier and the monitor.

*20. If flutter develops in the sound reproduction, it is necessary to:*

(a) adjust the rotary stabilizer or scanner drum; (b) tighten the takeup sprocket; (c) call the sound service man, (d) refocus the sound optical system.

*21. If the sound becomes weak, which of the following steps might be necessary:*

(a) replace the exciter lamp; (b) change the positions of the horns; (c) increase the current through the exciter lamp; (d) increase the voltage of the amplifier.

*22. What are the proper dimensions of a triangular "blooping patch":*

(a) about ½ in. long x ½ in. high; (b) ¼ in. long x ¼ in. high; (c) about ⅜ in. long x 1/10 in. high; (d) about ⅜ in. long x ⅜ in. high.

*23. If new projection equipment is installed in an old house, and the equipment manufacturer is a well-known reliable company that guarantees its products and yet the picture is not bright, what would you be likely to suspect first?*

(a) that the equipment is faulty; (b) that the screen is dirty; (c) that the power-supply voltage is low; (d) that you are not operating the equipment properly.

*24. The tests you made on the switchboard show the following: there are four bus bars marked A, B, C, and D. The voltage from A to B was 208 volts; from B to C 208 volts; from C to A was 208 volts, while the voltage from A or B or C to D was 120 volts. The service to the switchboard is:*

(a) 2-phase. 4-wire AC; (b) 3-phase, 4-wire AC; (c) 3-phase, 120 volt AC, (d) two 2-wire DC.

**(Correct answers on page 25)**

# SMPTE Convention April 29 - May 3

VISITORS to the 81st convention of the Society of Motion Picture and Television Engineers in Washington, D.C.. April 29—May 3, will have an opportunity to hear an unprecedented number of papers read this year, including discussions on such new and interesting developments as Videotape recording, Magoptical sound prints, closed-circuit color TV, and missile photography —optical techniques for determining rocket flight characteristics. Members will be given a practical demonstration of closed-circuit color TV at the Walter Reed Hospital.

In line with the fairly recent increased recognition of the projectionist as an important technician in the motion picture industry, there will be meetings of the newly-formed Projectionist Information Committee, a forum on Film Projection Practice, and a discussion of the all-important screen brightness.

Running Monday through Friday, a visitor will be hard put to attend all the sessions of primary importance to him, plus trying to take in the present-day and historical points of interest in the capitol city. This would include the industry exhibitions which will have products on display in an area set aside in the Shoreham Hotel, convention headquarters. One exhibit specifically important to the motion picture industry will be SMPTE's standards display. which will include late standards, and test films illustrated by color transparencies. This is the first time that the Society has had such an exhibit.

Welcome news at the convention is that last month seven of the eight Academy Awards for scientific or technical achievement went to members of the Society.

Dr. C. R. Daily, a Fellow of the Society, won an award for engineering and development of the Paramount lightweight horizontal-movement VistaVision camera. Roy C. Stewart & Sons and the transparency department of Paramount Pictures also were cited on the project. Richard H. Ranger, president of Rangertone, Inc., of Newark, New Jersey, garnered an Oscar for development of a synchronous recording and reproducing system for quarter-inch magnetic tape. Ted Hirsch, Carl Hauge, and Edward Reichard, a Fellow, of Consolidated Film Industries. Hollywood. received their awards for perfecting an automatic scene counter for laboratory projection rooms. Daniel J. Bloomberg, sound director, and William J. Wade, camera department, both of Republic Studios, were cited for the Naturama adaptation to the Mitchell camera. Consolidated Film Industries, Paramount, and Republic are all sustaining members of SMPTE.

A glance at some of the papers to be read that should be of special interest to projectionists is a fair indication of the trends and rapid developments the past year has brought, and a harbinger of future innovations to come.

Although among so many papers there are undoubtedly a number of general interest, below are some that should be of pertinent interest to the projectionist, with a short abstract of the contents:

### THE SOCIETY'S TEST-FILM STANDARDS

**BOYCE NEMEC**

**Management Consultant, New York**

Uniqueness of content sets one motion picture apart from any other. Yet to reach its audience at all, that same motion picture must be precisely standardized, a rigorous condition not imposed upon any other creative product. One of SMPTE's jobs is to determine "how standard." How this is done through test films is the subject of this paper.

### ANAMORPHIC LENS SYSTEM

**SEYMOUR ROSIN**

**Scanoptic Co., New York**

An anamorphic lens known as "Scanoscope" has been developed for use in motion pictures and television. The optical design is described, showing how the aberrations are controlled over a field angle of 80° or more. A unique coupling arrangement allows this lens to be used interchangeably with camera lenses of different focal length in a unit focus arrangement. Application of this system to the Mitchell NC and BNC cameras is described.

### ERASING MAGNETIC FILM FOR POP-FREE SPLICES

**CARL SHIPMAN and CARL HITTLE**

**RCA Film Recording Section, Hollywood**

When magnetic soundtracks are edited and then reproduced for motion-picture re-recording or other purposes, the splices in the track

(*Continued on page* 24)

SEND YOUR PROBLEMS HERE

# Projection CLINIC

## Stilbs, Apostilbs, and Other Odd Ones

PROJECTION LITERATURE is truly international both in origin and dissemination. And because of its diverse origins, it is peppered by a wide variety of photometric terms—*phot, millilambert, lux, footcandle, stilb*, etc. which do not have meaning for all projectionists everywhere. It's the old, old story of different technical languages, different units to specify the same thing. And photometric specifications, affecting as they do the brightness and ease of viewing of our screens, are mighty important.

No one expects conformity of usage. The common American system of measurement appears as hideous and unwieldy to metric-using Europeans as the English monetary system appears to Americans. But few indeed wish to make the change from an old familiar system. Reform, then, is not advocated. Only *understanding* is advocated—American comprehension of, for example, the German screen-brightness standard of 100 to 130 apostilbs, or a Continental comprehension of the British standard of 8 to 16 foot-lamberts.

The footcandle and the footlambert are photometric units familiar to all American and British projectionists—while all regard the lux and the apostilb as unfamiliar creatures of foreign breed. But some such units are the same.

Candlepower, expressed by the new term "candela," and the "lumen" are among the photometric terms of universal acceptance. The brightness of the carbon arc, for instance, is known by nearly all projectionists to amount to many thousands of candelas, while the quantity of light flowing from a theatre-projector lens is measured in thousands of lumens. Only when we encounter the candela and the lumen in European literature do we find ourselves on familiar ground.

### A STILB IS RESPECTABLE

A "stilb" is neither an illegal still nor a cold in the head. It is, in fact, merely the big brother of the "candles per square millimeter" used by most American carbon manufacturers for designating the number of candelas (candlepower) emitted by each unit area of the positive-carbon crater (see Fig. 1).

The peak brightness in the diagram is given as 950 candelas *per square millimeter*.

The stilb (sb) is a bigger fellow than candelas per square millimeter ($cd/mm^2$). The stilb specifies brightness in candelas *per square centimeter* ($cd/cm^2$). Because a square centimeter contains 100 square millimeters, the 13.6-mm crater mentioned above has a peak brilliancy of 95.000 stilbs. What could be simpler?

$$sb = 100(cd/mm^2)$$

Conversely:

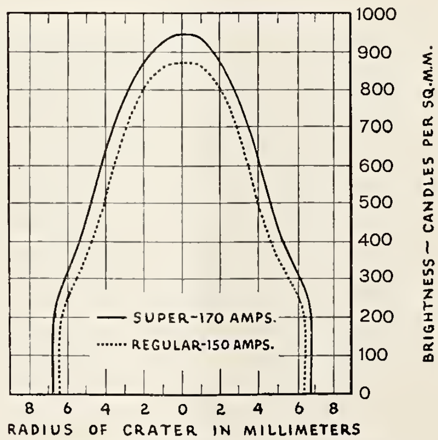
$$(cd/mm^2) = 0.01(sb)$$

We've taken a liking to the stilb. Disdaining circumlocution, it doesn't drag in other terms to express itself.

### ACCESSION OF LUMEN

Photometric history was made on New Year's Day 1940. As the climax of a brilliant scientific coup, Queen Candela deposed Hefnerkerze, the banana-oil candle, and literally rocked the little kingdom of Candlepower.

The term "candlepower" is deceptively simple. One does not necessarily produce a candlepower by burning a candle! Like people, some candles aren't quite so bright as others. The Hefner candle, for example. Only 0.86 as bright as the international standard candle, old Hefnerkerze abdicated, reeking of banana oil, in favor of radiant Candela, the undisputed Candle Queen.




Brightness distribution across crater of 13.6-mm HI carbons.

Conversely, a candela equals 1.16 Hefnerkerze (now in permanent exile for want of a lumen). And so Queen Candela, brought to the photometric throne by Prince Meter, bore three famous sons, Lumen, Lux, and Apostilb.

Europeans define the lumen (lm) as the luminous flux impinging upon 1 square meter of surface 1 meter away from a 1-candela source—a standard candle. Americans and Englishmen say: "A lumen is the luminous flux impinging upon 1 square foot of surface 1 foot away from a 1-candela source." But it's the *same lumen*—the luminous flux emitted in a unit solid angle (steradian), or $1/(4\pi) = 0.0796$ candela.

$$cd = 0.0796(lm)$$
$$lm = 12.566(cd)$$

The *size* of a beam of light has nothing to do with the amount of light flowing in it. The same number of lumens are present in the broad beam of light falling upon a screen as were present in the small, concentrated beam issuing from the projector lens.

The number of lumens in a beam may be calculated by multiplying the *intensity of illumination*—lux (lx) or footcandles (fc)—by the *area* of the illuminated surface—square meters ($m^2$) or square feet ($ft^2$).

$$lm = (lx)\ (\text{Area in } m^2)$$
$$lm = (fc)\ (\text{Area in } ft^2)$$

### LUX, BUT NOT SOAP

European projectionists bathe their movie screens in lux while we in English-speaking countries throw footcandles at the silver sheet. Of course, footcandles aren't candles on your feet, and lux doesn't always produce soapsuds. In projection practice, both terms refer to the *intensity of illumination* falling upon a surface (any area) placed at a specified distance from a 1-candela source.

Europeans place the illuminated surface 1 meter away from the standard candle and get 1 *lux* of light intensity; we place the surface 1 foot away from the same standard candle and get 1 *footcandle* of light intensity.

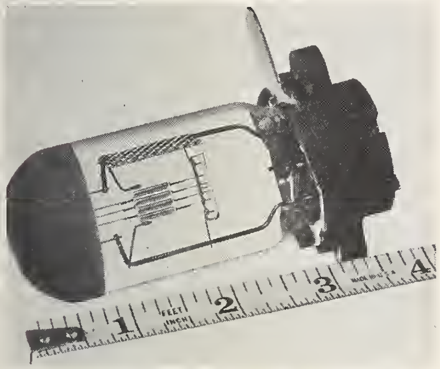
$$lx = \frac{cd}{(\text{Distance in meters})^2}$$

$$fc = \frac{cd}{(\text{Distance in feet})^2}$$

Lux and footcandles may also be calculated by dividing the number of lumens in the beam by the area of the illuminated

# New Products for the Industry

"Focus-Lok," a new type of projection lamp developed to permit new design concepts in motion picture and slide projectors, has been introduced by Westinghouse. According to the manufacturers, one of the chief advantages of the lamp



"Fokus-Lok" projection lamp, showing the new base and socket for precise alignment.

is a precise locked-in prefocused alignment resulting from a new base and socket construction. A simplified locking device on the base is claimed to provide perfect alignment with a projector optical system.

The "Focus-Lok" is constructed compactly, measuring as little as four inches in length as compared to the previous seven inches. Because of this compactness and the fact that the lamp will burn base down or horizontal, it is expected to encourage construction of smaller, more compact, and streamlined projectors.

The exclusive positive-locking device permits easy insertion and removal, and base and socket construction provides positive-pressure electrical contacts which make the lamp applicable for higher wattages, Westinghouse states.

The lamp, developed by Westinghouse and Bryant Electric Company engineers in conjunction with projection manufacturers, also includes a grid screen to prevent the glass from blistering, and to collect a large portion of the black deposits that normally form when a projection lamp burns. Another feature is a strong non-twist type tungsten to prevent filament sagging. There are also special bridge supports and a visible built-in fuse.

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Solder-matic Attachment, to be mounted on all popular models of electric soldering guns, is now being offered by Atlas Manufacturing Company of Alabama. Function of the tool is to trigger solder from a spool in the attachment through a guide tube to the tip of the soldering gun.

The manufacturers claim that the new tool greatly speeds up soldering opera-

New Solder-Matic attachment, illustrating freedom given to one hand during soldering.

tions, as solder is always at the tip of the gun. Being designed for one-hand operation, it leaves operator's other hand free to hold the work. The attachment will be distributed through electronic, automotive, and hardware jobbers, as well as industrial suppliers.

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An Interferometric Comparator that makes routine comparisons of length to the nearest ten-millionth of an inch has been developed at the National Bureau of Standards. This extremely precise instrument will be used to check lengths of industry's master gage blocks which control tolerances of mass-produced machine parts.

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An improved unidyne microphone is now on the market, manufacturers Shure Brothers claiming a 41% higher output. The unidirectional mike is recom-

Shure Unidyne microphone

mended for installations where feedback is a problem, low-gain public address systems' and tape recorders.

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surface (such as a movie screen):

$$\text{lx} = \frac{\text{lm}}{\text{Area in m}^2}$$

$$\text{fc} = \frac{\text{lm}}{\text{Area in ft}^2}$$

The footcandle is nearly 11 times more intense than the lux. To convert from one unit to the other, use the following formulas:

$$\text{lx} = 10.764(\text{fc})$$
$$\text{fc} = 0.0929(\text{lx})$$

### THE SHINING APOSTILB

Project a beam of light upon any extended surface. The surface then becomes luminous by virtue of reflected light, doesn't it? Well, units have been devised to express the brightness, or luminance, of illuminated surfaces. The "apostilb" (asb) is the European unit; the "footlambert" (fl), the American-British unit.

The "lambert" is still another such unit; but whereas even 1 lambert of brightness is far too bright to be viewed comfortably, the millilambert (0.001 lambert = 0.929 footlambert) has been created. Neither lamberts nor millilamberts or their associated intensity units, phots and milliphots, are much used in projection. (Lambert = 1 lumen emitted per cm$^2$; phot = 1 lumen incident per cm$^2$—but why say more? Upon the phot we do not dote, which is how it is pronounced.)

Back to apostilbs and footlamberts, then. The apostilb is the brightness of an extended surface emitting 1 lumen per square meter. The footlambert is the brightness of an extended surface emitting 1 lumen per square foot. Motion-picture screens (unless of the translucent, back-projection variety) emit light only by *reflecting* it; and since they reflect only from 0.6 to 0.9 of it (about 0.8 in the case of a matte screen), apostilbs and footcandles may be calculated by multiplying the intensity of the incident light (lux or footcandles) by the screen reflectance (r).

$$\text{asb} = (\text{lx})\text{r}$$
$$\text{fl} = (\text{fc})\text{r}$$

The apostilb, however, is not nearly so bright and shining as the footlambert. In fact, it is only about 0.09 as bright! So, you see (by using the following conversion formulas), the 100—130 apostilb German screen-brightness standard amounts to only 9.29—12.08 footlamberts, which is about the same as the American standard (9—14 footlamberts).

$$\text{asb} = 10.764(\text{fl})$$
$$\text{fl} = 0.0929(\text{asb})$$

## FOR CABLE THEATRE

(*Continued from page* 13)

have lost in the last ten years."

In essence, TM's backers believe that telemovies are nothing more than a new method of merchandising the industry's product—projecting pictures from a local theatre onto home screens is merely a "third type of theatre." Enthusiasts were recalling that first there had been the four-walled house, then the drive-in. This was the logical extension of the business — taking movies into the home.

"It's time for us to step out boldly and put an end to the era of decline in our business. In the past decade we've seen too many elements of motion picture entertainment go downhill—attendance, employment, profits, and the number of pictures. We believe TM will stop the decline and put this industry on the rise again." Quote, again, Mr. Griffing, who seems to have emerged as the spokesman for telemovies.

### No Corner on Market

But although right now the southwest, particularly Oklahoma, seems the hottest on TM, there is no corner on telemovie control, no franchises, no patents. On the contrary, telemovie sponsors are eager to have as many people in as possible, feeling that if operations snowball throughout the country, it will create a demand for more product, something that the exhibitor has been asking for some time now. In addition to the non-exclusive-deal policy, no single supply firm will be singled out to furnish equipment.

To start this snowballing, Video Independent Theatres have taken the lead. A small storm of publicity releases and speeches has preceded a number of deals. Enid, Oklahoma, is next in line to receive TM, and permits to show first-run closed-circuit motion pictures are being acquired in most of the towns of over 15,000 population where the chain owns theatres—and it owns more than 100.

In Oklahoma City, virtually all individual theatre owners and firms—about 20, representing nearly 50 theatres, have responded favorably to Griffing's offer to come in as partners in telemovie operations for that city, which has a population of 300,000. Exhibitors will be offered a financial interest in proportion to their present business. The way the deal will work is this: Vumore Co., which is Video's TM subsidiary, will manage the operation, and will get a 25 per cent reserve. The other 75 per cent will go to the exhibitor-partners, Video receiving 5 per cent of the gross revenue as a buying-booking-administration fee. Outlay for equipment and installation will cost between $2 million and $3 million. Permit to install coaxial cable and other necessary facilities has already been granted by the city council.

### Competition Already

Further south in Texas, two firms are competing for permission to install telemovies. The Interstate Circuit, Inc., an affiliate of ABC-Paramount, has been seeking permission of the city council of Austin to file application for permits to build transmitting facilities to serve more than twenty cities throughout the state, including Austin, Fort Worth, Houston, and Amarillo. Preliminary surveys by engineers to determine the problems for installing point-to-point television have already been made.

Interstate has taken these preliminary precautions to meet the threat of outside competition from Capital Cable Corp., a subsidiary of Midwest Video Corp., in which Winthrop Rockefeller is said to be the major investor. That firm proposes to set up a home-toll TV system, on a closed circuit. Strictly speaking, TM is not a toll system, but on a subscription basis—but both systems are cable theatre, and even though the Bartlesville experiment has not been made, and even though the whole idea is still in the first experimental stages, the power fights seem to have started.

There has been a rash of similar applications in such places as Little Rock, Arkansas (two firms competing there also); Carlsbad, New Mexico and in Meridian, Mississippi, a local theatre owner has already put in a purchase order for TM equipment. The population of Meridian is 42,000. The population of Bartlesville is 28,000. There is some feeling abroad that cable theatres can only be profitable in communities having a population of 15,000 or more. According to latest census figures, there are 915 such communities in the country.

Los Angeles has already gotten a look at closed-circuit TV. Last month Telemeter ("box office in the home"),

(*Continued on page* 26)

## AGAINST CABLE THEATRE

(*Continued from page* 13)

One who is well acquainted with the problems of handling houses in the metropolitan area is Edwin Gage of Walter Reade Theatres, and he has large doubts about the benefit of telemovies to theatres. It is, he considers, "a foot in the door for toll TV. You'd just need a booth in a store or a vacant lot. And while they talk now about 35-mm, it's sure to be cut later to 16-mm." Gage further pointed out the loss to the equipment business and concession revenues.

One circuit head opposed to TM speaks from experience. That is Gerald Shea, head of the Shea circuit which operates in Massachusetts, New Hampshire, Ohio, Pennsylvania, and New York. The Shea chain was the first to try closed-circuit TV. It lost $60,000, and Shea is understandably reluctant to try again.

### Chaos Predicted

Ernest G. Stellings, head of Theatre Owners of America, has gone on record as an opponent of telemovies, believing that the innovation would only lead to closing of theatres, plus creating chaos in the clearance and availability department. Although no official action has been taken by TOA, it is keeping a wary eye on the outcome of the Bartlesville test.

Some companies have closed the door on issuing any product for cable theatre use, among them Universal, which has indicated that it will not provide. And Spyros Skouras, 20th-Fox leader, has clearly outlined that his company would offer no cooperation to those seeking aid in setting up wired pictures. 20th-Fox has embarked on a program that is dedicated to keeping theatres open, with a special aside to helping small theatres, and it is of the opinion that any cable theatre program is harmful to theatres, and a deteriorating influence. Skouras has stated, with some justification, that films-for-a-fee on TV have a fairly dismal outlook as long as the viewer can get others gratis.

What is giving a good number of industry members confidence is the apparent upsurge of movie attendance, coupled with a general indication that the movie business is up off the canvas, and still swinging. The trade paper *Variety*, has taken a fairly close and careful look, and has come up with

some pertinent points:

Surveys and polls, particularly those of Sindlinger & Co., have shown a steady upward trend of attendance.

Although winter is a time for high-pressure TV entertainment, the movies have weathered the cold spell well with rising patronage.

Trade editors have noted a perked-up interest in movies akin to the halcyon days before TV.

Over the last ten years seating capacity has greatly increased, and the impetus of stepped-up drive-in construction has tipped the scales so that there are more theatres opening now than closing.

The removal of the Federal ticket tax has allowed owners to remodel, modernize, and refurnish their houses, always an important step to bring in business.

Not only the quality, but the quantity of pictures has been upped, and the public—if, for example, "Giant" is any indication—has shown that it will go out for quality pictures.

The studios have shown a willingness to take full advantage of their facilities and to broaden their production horizons.

Old A movies on TV have not hurt theatre attendance as feared, and some exhibitors feel that the old movies have stimulated an interest in present-day product.

Production, distribution, and exhibition have been making strong attempts to cut extravagances and unprofitable operations.

The overall picture seems to be one of confidence and optimism. Why then, some exhibitors are asking, go over into the enemy's camp now that we've gotten a little of our own back? They feel that any compromise with TV will lead to the closing of theatres. And, they are also asking, where's the money coming from? It is estimated that it will take a minimum of $300,000 to install a telemovie set-up, and opponents are somewhat cynical as to where the $300,000 is coming from. They also consider that $9.50 a month toll to subscribers fairly steep.

But whether the Bartlesville experiment will be a success or not, one thing is certain: the eyes of the industry will be on the Oklahoma town for some time.

## SMPTE PAPERS ABSTRACTS

(*Continued from page* 19)

frequently cause audible pops to be heard in the reproduced program material. Among the causes of pops is improperly erased magnetic film or tape. Pop elimination from this cause is achieved by use of eraser which does not produce "spokes."

### BALCOLD REFLECTOR

H. H. SCHROEDER and A. F. TURNER

Bausch & Lomb Optical Co., Rochester, N. Y.

An infrared transmitting elliptical reflector for use in motion-picture arc lamps has been developed. The evolution of this optical device, which reduces total radiation by 40% without appreciable light loss, is traced. Engineering aspects of the development of this reflector are discussed. A demonstration emphasizing the properties of the mirror will be given.

### COMMENTS ON PROCEDURES USED TO COMPARE THEATRE SCREENS

YORICK G. HURD

20th Century-Fox Film Corp., N. Y. C.

The paper describes ways of comparing the reflecting and light-distribution properties of several theater screen surfaces. Comments are made on instruments (integrating spheres, goniophotometers, spectrophotometers and brightness meters) used in comparing screen surfaces. Lenticular screen design and "gain" formulas are presented with examples of their use in estimating a screen's performance. Data on white, "silver" or aluminum, beaded, pearl, and lenticular screens are included. A screen composed of several screen surfaces will be demonstrated.

### MODERN THEATRE SERVICE PROCEDURES

EDWARD STANKO

RCA Service Co., Camden, N. J.

With the development of improved theater sound and projection equipment, the professional theater sound service engineer must keep pace with the technical and engineering developments by constantly improving and, when necessary, revising service procedures. The subject paper deals with the requirements of modern theater service procedures, the methods and equipment used and their overall results.

### TRANSPARENT MAGNETIC TRACKS

GEORGE LEWIN

Army Pictorial Center, Long Island City, N. Y.

Most of the problems which arise when magnetic and optical tracks are combined on the same film would vanish if the magnetic track could be made transparent, so that both could be superimposed for either simultaneous or independent reproduction. Full-width tracks could be used and head wear would be uniform. The author shows that this goal can be substantially achieved under certain conditions, and will demonstrate several recordings.

### A "GO—NO GO" GAUGING METHOD FOR VISUAL INSPECTION OF RELEASE PRINTS

MAXWELL A. KERR

Melpar, Inc., Falls Church, Va.

A method will be explained and demonstrated for using a 16-mm projector with a special picture aperture plate as a "Go—No Go" projection gauge for checking several print characteristics while viewing the projected film. This includes checking soundtrack center ring; modulation of variable-area tracks; width of variable-density tracks; variations in width of film stock; blackness and freedom from scratches of soundtrack septum strips; placement and blackness of printed frame around pictures; percentage jump and weave in the projected picture; percent shrinkage of the film stock.



### Nostalgia on Microfilm

Recordak 35-mm microfilm continues on its way in preserving Americana. Latest historical document to be recorded on microfilm is a complete set of Sears Roebuck catalogues from 1892 to the present. The project took about a mile of film on 100-foot spools. Film will be kept in various public and university libraries.

## PERSONAL NOTES

Robert W. Brown has been appointed manager of the editorial service bureau of Eastman Kodak Company's advertising department. The bureau supplies editorial material on photography and Kodak products to newspapers, magazines, radio, and TV.

Brown was camera editor of the *New York Times* before joining Kodak in 1941. During World War II he served in the Navy as a photographic specialist, earning a letter of commendation for his work in the V-mail service. He is active in the Photographic Society of America and the National Press Photographers Association, as well as being an associate of the Oval Table Society of New York City, a photographic group.

Robert W. Brown

* * *

Bernie M. Bodde, of the Bodde Screen Company, has been appointed executive vice president and general manager of that firm. The appointment by the board of directors and stockholders came as a result of Bodde's contributions in the development of the Bodde White Platinum and Wide-Angle Translucent screens.

* * *

Edmour F. Giguere will hold the newly created position of manager of the New Market Coordination section of the Marketing department of RCA Components division. He will be responsible for the introduction of new products to both equipment and renewal parts distributor customers.

### Answers to Projectionist Exam

| | | | | | |
|---|---|---|---|---|---|
| 1. | C | 9. | D | 17. | B |
| 2. | B | 10. | C | 18. | D |
| 3. | A | 11. | A | 19. | C |
| 4. | A | 12. | A | 20. | C |
| 5. | D | 13. | C | 21. | A |
| 6. | A | 14. | D | 22. | C |
| 7. | A | 15. | D | 23. | B |
| 8. | B | 16. | A | 24. | B |

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### Theatre Blast in St. Louis

With "Away All Boats" bobbing dramatically on the screen, a compressor pump from the air conditioning system suddenly exploded in the 5000-seat Fox Theatre in St. Louis, Mo., recently. Some 900 patrons were immediately notified and all filed out unhurt under the expert direction of the theatre's personnel. Ten firemen and two theatre employees were overcome in the battle against the gas fumes.

### FOR CABLE THEATRE

(*Continued from page* 22)

a coin-box-attached-to-the-set outfit that is a subsidiary of Paramount Pictures. gave a public demonstration and revealed some ambitious plans for its future. One of these plans includes installation of special equipment into present community antenna systems, with a special "On-Channel System" for those sections not equipped to handle the low frequencies required by the Telemeter system.

#### *In on the Ground Floor*

There seems to be little doubt that there is a growing enthusiasm for cable theatre, and the mounting tide to get on the band wagon would seem to indicate that there is a good deal of confidence in the outcome of the Bartlesville experiment.

Even the most rabid of enthusiasts for cable theatre have admitted that there were, and are, solid problems to cope with. The cost, for one thing. $2 million to $3 million for a metropolis the size of Oklahoma City (pop. c. 300,000), at least $350,000 for Bartlesville. But it is estimated that TM needs but 1500 subscribers in a town the size of Bartlesville to break even on operating costs; 30,000 in the oil country capital for a successful operation. Concerted thinking has it that the cost would be roughly the same as a deluxe conventional theatre of 1200 to 1500 seats, but the effect would be to give the exhibitor several times that many seats. And the $9.50 a month price (which will fluctuate according to community size) is expected to be

lowered once the number of subscribers goes over 10,000. Overall, the average cost for TM installation is expected to come to around $300,000.

And, of course, there are always the technical problems. Chief among these is the difficulty of projecting CinemaScope product. General Precision Laboratory has come up with what it considers an adequate answer to that. The method involves use of a variable anamorphic attachment, instead of the usual fixed type, and a slight squeeze, expanding the image only to a 2 to 1 ratio instead of the full 2.35 to 1. After some cropping on both sides of the picture, the final aspect ratio is somewhere around 1.66 to 1, which, the technical firm considers, will retain all necessary viewage.

### *Majors Will Distribute*

When a large manufacturer of theatre equipment goes to the time and trouble of coping with the specialized problems of a not-yet established phase of the motion picture industry's program to bring the "lost audience" (if it ever were) back, it is cause for reckoning. Add to this the fact that at least three major distributors have agreed to supply product to TM—United Artists, Allied Artists, and Columbia—and it would seem that certain focal members of the industry are definitely interested. Supporters of telemovies believe that other companies will follow suit once the fever has caught—and they are in no doubt as to whether the fever will catch.

And what will the subscriber get for his money? 13 first-run pictures a month, a day's program running continously for eight or ten hours . . . "to get away from the disadvantage of TV movies—that you have to be in front of your set at a given hour."

Proponents of TM are quite firm in insisting that a swing to cable theatre is not a grasping-at-straws move by a troubled industry. President Griffing strongly urges that all concerned with the motion picture industry stop looking for a "whipping boy." "The exhibitor can't exist unless he regains his lost audience. The producer can't make more pictures until we are able to pay him more money. Instead of criticizing each other, we all ought to use our energy and talents to bring back that audience—and we believe telemovies will do it."

Whatever its future, TM has created enough of a stir in movie circles to insure at least an interested curiosity about the outcome of what is now becoming to be known as the "Bartlesville Experiment." A strong point in TM's favor is that cable transmission does not come under the jurisdiction of the Federal Communications Commission. And however concerned members may view this latest hypo to the trade, it must be considered that its backers are ambitious, energetic, and confident.

### Eastman Kodak Expands

This year Eastman Kodak expects to spend around sixty million dollars for additions and improvements to its plants, processes, and equipment, the company has announced. Its largest annual capital expenditure budget will go to the various units of the firm throughout the United States, $32\frac{1}{2}$ million of the fund being expended on the Rochester facilities alone. Last year the company budgeted fifty-seven million for expansion.

Preliminary indications are that Kodak's fourth quarter business is above that of a year ago, mainly attributed to sales gains in the firm's photographic, plastic, and chemicals departments. The introduction of new products such as the Signet Verifax Office Copier, Type S Ektacolor Sheet Film, and various dyes and plastics has helped the expansion program.

In the film field, Kodak has been developing a new high-speed black-and-white film for sports and news photography that is claimed to be four times as fast as present Kodak high-speed film, and in the x-ray field, a new processor for medical x-ray films which purportedly reduces from one hour to six minutes the time required to process those films.

## CONVERSION METHOD

(*Continued from page* 12)

ohms. The predicted loss may be determined by:

$$db\ 10\ \log \frac{Z\ out}{Z\ line}$$

$$\text{and}\quad db\ 10\ \log \frac{500}{250}$$

$$\text{then}\quad db\ 10\ \log\ (2)$$

$$\text{and loss in db } 3.01$$

### *Impedance Must Be Equal*

In using the logarithm equation for voltage or current values, the reader must bear in mind that readings taken with db or VU meters at input and output points must be at equal impedance values, or their relation is destroyed in accord with the correction tables listed in this article.

Power values may be used without correction, since the amount of power dissipated in the load impedance must take into account the value of that impedance.

Another point which needs to be mentioned before closing is the common statement encountered pricipally in connection with the output rating of a microphone or a pickup. Data sheets may contain the information that a certain device has an output level of –60 dbm. This dbm abbreviation has caused much confusion, and there is no reason for the confusion to continue. Dbm is tranlated as meaning that O db is at a reference level of 1 milliwatt.

At this point we are back again to a value which is based upon the same zero reference as the Volume Unit insofar as power is concerned. Thus we have established that dbm is equivalent to VU, and we have discussed the relationship between db and VU in which power, voltage, or current ratios may be expressed over an extremely wide range with a small change in numbers. For instance, 1 db is just about the same ratio as 5 is to 4, while 60 db describes a ratio of 1,000,000 to 1.

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## NEWS AND VIEWS

(*Continued from page* 18)

other IA Locals along the Coast will join us in the drive to help this worthy cause.

Boris, incidentally, is a transplant here in Southern California and hails from New York City where he worked for 18 years at the Rivoli Theatre on Broadway.

Among the many newcomers to this part of the country is Brother George Hiam, member of Local 299, Winnipeg, Canada. George is no longer working at the craft—he feels that the 25 years he spent cooped up in a stuffy projection room is quite enough. He is presently employed as a sales representative for the Sears Pasadena store and is very happy in his new job.

### *Things to Come*

In future issues of IP I will tell you about several very interesting visits I made recently to Allied Artists and Metro-Goldwyn-Mayer studios. I'll also tell you about my visits to the studios of 20th Century-Fox and to the CBS Television station (local and national transmission) in Hollywood. The interesting and unusual projection room installations at the Screen Directors' Guild and the Century Drive-In will also be discussed in these columns.

---

### A Pioneer Passes

Enoch Rector, one of the pioneers of motion pictures and an early associate of Thomas Edison, has died at the age of 94. Rector, who also worked with Edison on the phonograph, designed a shutter which improved the early projectors. He and the late William Brady showed the first film on Broadway, that of the Corbett-Sullivan fight in 1897.

### Anyone for 49¼-mm?

MGM's "Raintree County" (running time: 3 hours; cost: $5,000,000) may be issued in 65-mm film, although even the company has postponed thinking about it at this stage. It is understood that theatres equipped for Todd-AO would be able to handle 65-mm, but exhibitors and a few others in the industry are hoping for 35-mm. No decision as yet.

## DRIVE-IN PROJECTION

(*Continued from page* 10)

replaced when discolored or whenever the surface has a slightly frosty appearance. The treated surface of a dichroic filter must be wiped very gently to avoid damage.

Forced-air cooling of the film, itself, must never be regarded as a substitute for either water-cooled gates or heat filters. Filters are absolutely necessary at high arc currents; air cooling is not. Cooling of the film by means of air blasts only slightly decreases the likelihood of film damage by the arc currents necessary for successful drive-in projection.

### *Dust Dilemma*

Glass in the projection ports wastes about 10% of the light if uncoated, only 2%—3% if antireflection-coated. Unfortunately, coated panes of optical plate glass are very costly. No glass at all gives the best results, but only if there is no dust problem. Projection-room ventilation tends to draw dust inside to settle upon the projection lenses, in mechanism bearings, and in the soundheads. The gritty dust stirred up by automobiles entering and leaving the parking area is far more ruinous to film than the softer dust particles found in the air of indoor theatres.

Projection buildings constructed so that the floor is on or slightly below ground level are seriously bedeviled by the dust-and-dirt problem. Sandy dust is heavy: it tends to settle to the ground very quickly unless high winds prevail. The subterranean projection room gets more than its just share. Only when the projection room is considerably elevated above ground level does the problem of minor dust storms assume minuscule proportions.

The use of an unpainted cement floor in the projection room is as bad in a drive-in as it is in a conventional theatre. Cement is exceptionally gritty. The dust scuffed up from an ordinary cement floor scratches the lenses and wears out mechanism and soundhead bearings. There are chemical treatments for cement floors; and these should be used when winter dampness precludes the use of paint or battleship linoleum.

Being at the "business end" of the optical setup, the screen is the chief object of the projectionist's interest outside of the projection building. Important as is the sound, the success of the presentation is made or broken by the screen. A picture too dim to see clearly, or marred by visible seams, will not induce any audience to return. Unpainted composition panels are light gray, not white, and accordingly waste too much of the projection light. And projection light is exceedingly feeble when spread out over several thousand square feet of screen surface!

### *Screen Luminosity*

The reflectance of a good matte (white) drive-in screen should be on the order of 0.8; and with special white screen paints now available, a reflectance approaching 0.9 is within reach. Drive-in screens have the advantage over indoor screens that they are not perforated for the transmission of sound. This represents a light gain of nearly 10% over indoor screens surfaced with similar pigments. Aluminized screens, as we said, are too "tricky" to use unless screen area is extremely large and the top of the screen is tilted forward to reflect light down into the parking area.

The size, shape, and orientation of a drive-in screen is largely determined

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by the specific structure of the screen tower, and therefore beyond the projectionist's control. It is only when the screen and portions of the tower are modified for widescreen presentation that the projectionist can influence the final result. It should be kept in mind, for example, that merely cropping the height of a conventional 4:3-proportioned screen for CinemaScope is a poor expedient. A *wide* screen should have a greater area than the old screen it replaces.

Use of a false stage or "shadow box" is helpful for preventing skylight from shining onto the screen and "washing out" the picture during the early hours of the evening. The roof of the box may extend considerably beyond the wings at the sides. The wings must be angled and kept short enough to let the patrons at the ends of the ramps see the entire screen surface.

### Parking-Area Lighting

The parking-area lighting facilities required for the convenience of patrons frequently militate against good projection. Cars must enter and depart, and the projectionist also knows that the concession counters contribute a large share of a drive-in's profits. He may nevertheless also reasonably expect cooperation lightwise: the picture, itself, is the chief commodity.

So-called "moonlight towers" and other forms of ramp lighting should be constructed to illuminate the ground, not the screen. Floodlights on the screen tower, itself, should always be turned off while pictures are being shown, and lights on billboards, ticket offices, etc. must be shaded from the eyes of the audience.

Shaded post lights are the preferred means of ramp illumination during projection. These should be just strong enough to indicate empty car positions and to reveal the whereabouts of the in-car speakers, electric heaters for cold weather, and their associated connecting cables. No patron should be forced to fumble in the dark for the accessories he needs for enjoying the show.

The occasional flare of auto headlights on the screen cannot always be prevented in spite of large signs requesting the use of parking lights only. (Diplomacy is required of attendants.) Far more serious is the summer twilight in northern latitudes when the screen faces the northwest. As it never gets completely dark at night in June and July above North Latitude 45°, a west-facing screen necessitates a long delay in show-starting time during the months of perpetual twilight.

The moon is troublesome only when it shines into the eyes of patrons. Even at its brightest, moonlight is rather feeble in the northern hemisphere in the summertime, for during the season of drive-in operation, the full moon swings low in the southern sky, rising in the southeast after sunset and setting in the southwest before dawn. The intensity of full moonlight incident upon a perpendicular surface ranges from 0.02 to 0.03 of a footcandle, which is not enough to affect a picture projected at a blank-light level of at least 2½ footcandles measured with the shutter running. (This corresponds to a matte-screen brightness of about 4 footlamberts measured *without* the shutter.)

Aside from the use of a shadow box and having the screen face the east, nothing can be done to combat the long, late twilight of the northern summer. The earth revolves on a tilted axis, and the sun is bigger than we are. The Australians are annoyed by similar problems during their warm months of December and January.

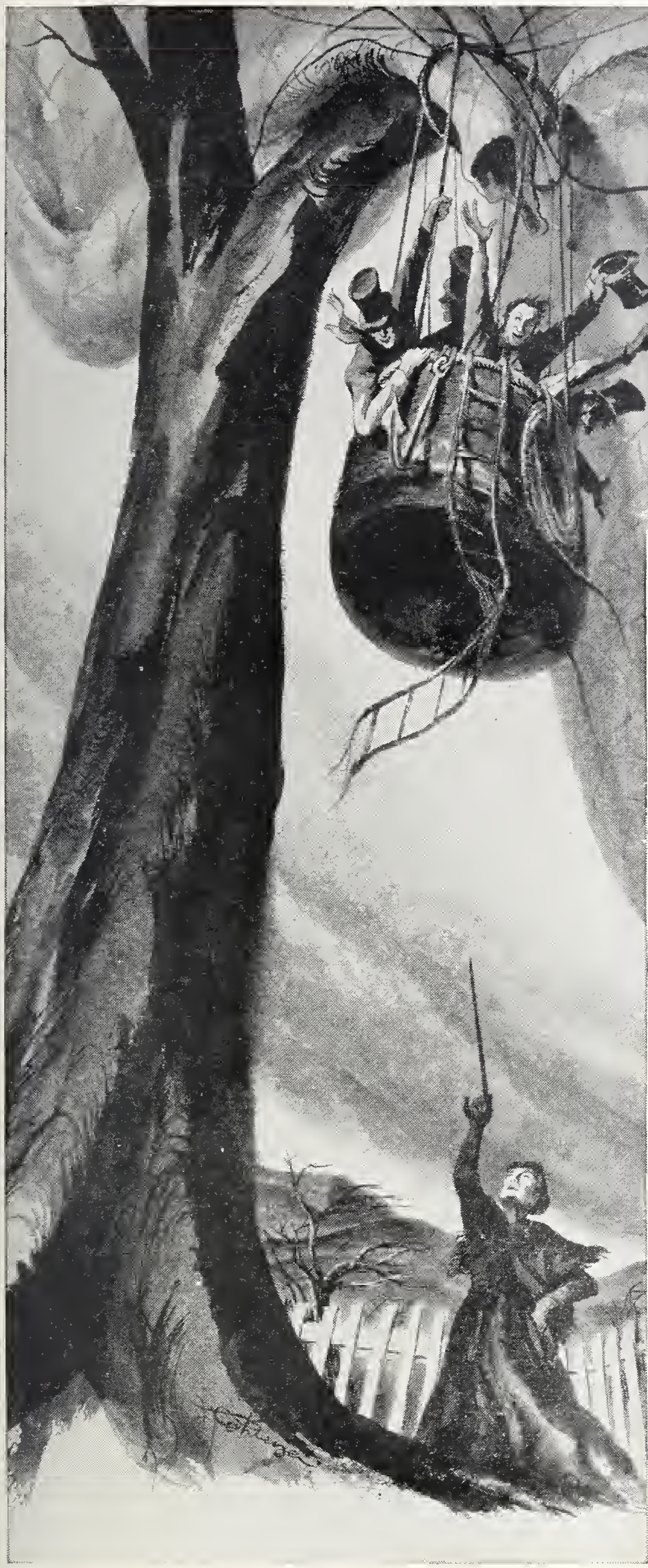
If a drive-in show starts too early, the first few reels will lose much of their entertainment value, and particularly if they be color prints. A light-struck screen robs the movies of their illusion of reality. It is thus a good idea to begin a drive-in program with black-and-white shorts and save the color cartoons and novelty reels to precede the feature.

### Use Smaller Picture

If, for any reason, it becomes absolutely necessary to begin the show when bright twililght all but drowns out the picture, use lenses of longer focal length for a smaller, but brighter, picture. We suggest the standard 1/1.375 aspect ratio for non-anamorphic films, with a picture height equal to the CinemaScope screen height. The public will not object. The switch to widescreen apertures and lenses should be made only after it becomes dark enough for comfortable viewing at lower light levels.

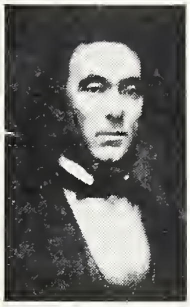
Fog and mist, unfortunately, are meteorological conditions we can do nothing about. The writer once thought of using blue-absorbing yellow or amber filters over the projection lenses: but the prevalence of color films and the difficulty of adequately illuminating gigantic screens rules out a deliberate loss of projection light—even the loss of fog-scattered blue and violet rays.

[TO BE CONCLUDED]



Picture of John Wise from AMERICAN HERITAGE

# The old lady gave him what for



An old lady living near Henderson. N. Y. in 1859 was shocked at the way the four men had arrived—and said so. Such sensible-looking men in such an outlandish vehicle!

But John Wise and his crew, perched up in a tree, were far too happy to listen. Caught by a storm, their aerial balloon had almost plunged beneath the angry waves of Lake Ontario. Then, after bouncing ashore, they had crashed wildly through a mile of tree-tops before stopping in one.

Now, his poise regained, Wise stood up to proclaim: "Thus ends the greatest balloon voyage ever made." He had come 1200 miles from St. Louis in 19 hours, setting a record unbroken for 60 years.

He had also proved his long-held theory of an earth-circling, west-east air current—and that was far more important to him. For Wise was no carnival balloonist. He was a pioneer scientist of the air, a man whose inquiring mind and courageous spirit helped start the vast forward march of American aviation.

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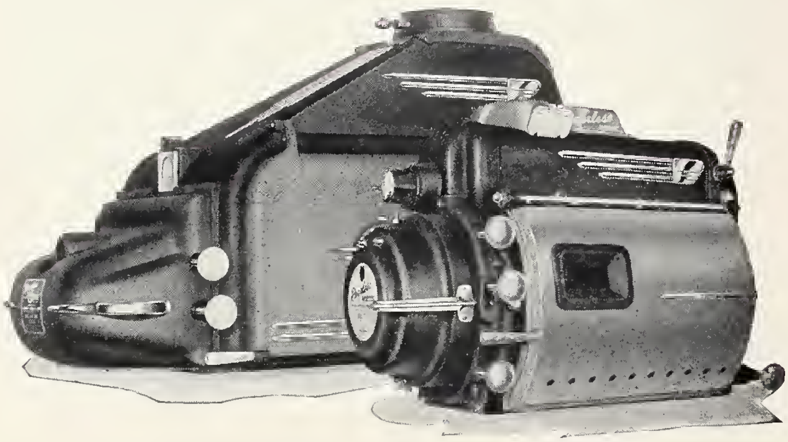

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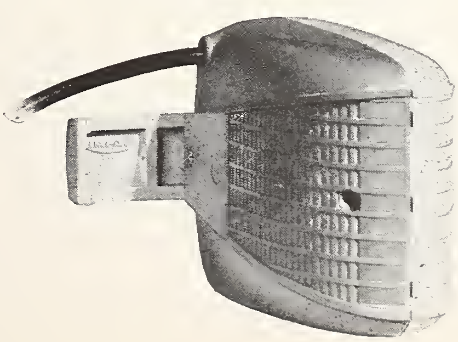

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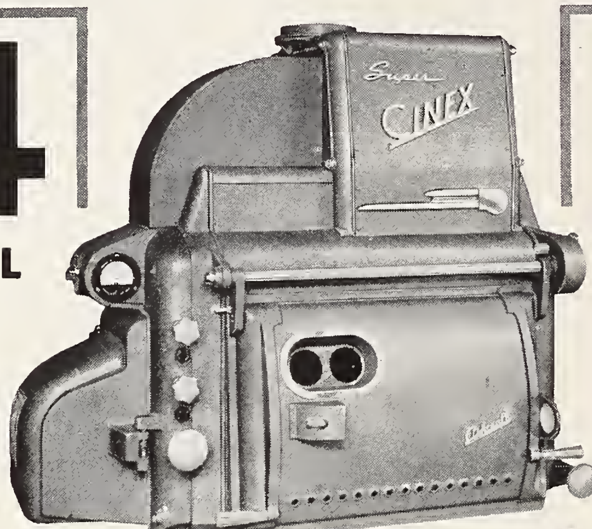


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INTERNATIONAL PROJECTIONIST

Volume 32 MAY 1957 Number 5

**An IP interview with Motion Picture Research Council chief William Kelley, and a look at past accomplishments and future plans.**

# Motion Picture Research Council: An Industry Technical Aid

By ROBERT MacLEOD

CLOSER technical cooperation between Hollywood studios, exhibitors, and research organizations is continually being achieved by the Motion Picture Research Council, William Kelley, executive director of the organization, reports. Kelley, visiting the East prior to the SMPTE convention last month, in an interview with IP described the purpose of the new special representatives of the Council who are touring the country providing technical assistance to exhibitors and projectionists.

Special representative Kenneth Wingo, for example, is on a year's tour of the country's theatres, and by the year's end will have compiled a list of the common, major technical problems encountered in projection. This will enable the Research Council to achieve a better understanding of the problems of both exhibitor and studio, and to advise accordingly. The Council is supported by all major Hollywood studios.

Kelley, a Fellow of SMPTE, flew to New York to confer with Frank Cahill of Warner Brothers, who is chairman of the local Council Committee which was formed a year ago. Some of the problems still occupying the Council are standardization of release prints, proper screens to conform to the particular theatre shape, steep projection angles, and the best degree of density for prints to be shown on wide screens. In the latter case, the Research Council has made some gains in influencing the studios to avoid filming scenes in a darker mood than is good for efficient, bright wide-screen presentation.

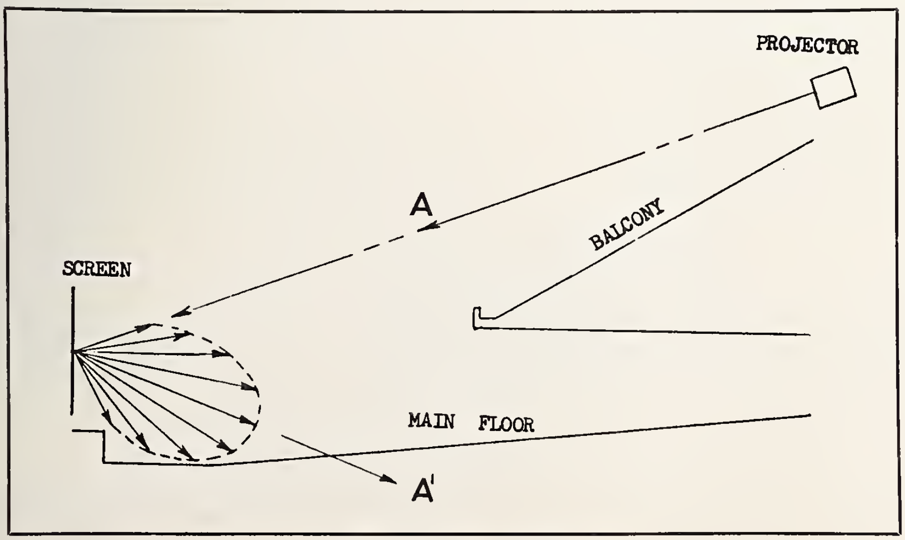



FIG. 1. Screen vertical.

### *Steep Throw Angles*

The matter of steep projection angles has been called attention to by the special representatives in the field, who have been encountering an inordinate number of theatres with excessively steep throws. Besides the serious problem of keeping the picture in focus, it is usually the case that the projectionist, viewing the picture from a different angle than the spectators, cannot be sure that his picture is in the best possible focus. (A somewhat offbeat solution to this problem has been offered in Great Britain: remote control focus—have someone on the floor near the screen who, by means of remote control apparatus, adjusts the lens up in the projection room. Other

sources have suggested supplying the projectionist with binoculars.)

Tilting the screen is one solution offered by the Research Council, and the problem has been considered in one of the group's Informational Bulletins.

Ideally, curving the directional screen vertically as well as horizontally (away from the audience) would be desirable, but installation-wise, this is impracticable.

Illustrating effects of screen-tilting, in Fig. 1, line A represents the ray of light to the center of the screen, and line A', the direction of specular reflection. It can be seen that the front rows of the orchestra will receive the most light, and the balcony the least. Figure 2 shows the results of tilting the screen, giving a fairly normal diffusion of light. In tilting the screen, the direction of the specular reflection should be toward the preferred seating area, about one-half the projection angle.

The recent development of the lenticular screen, where the small depressions are themselves tilted has given in some cases an optimum tilt of the brightness pattern, while the screen itself remained vertical.

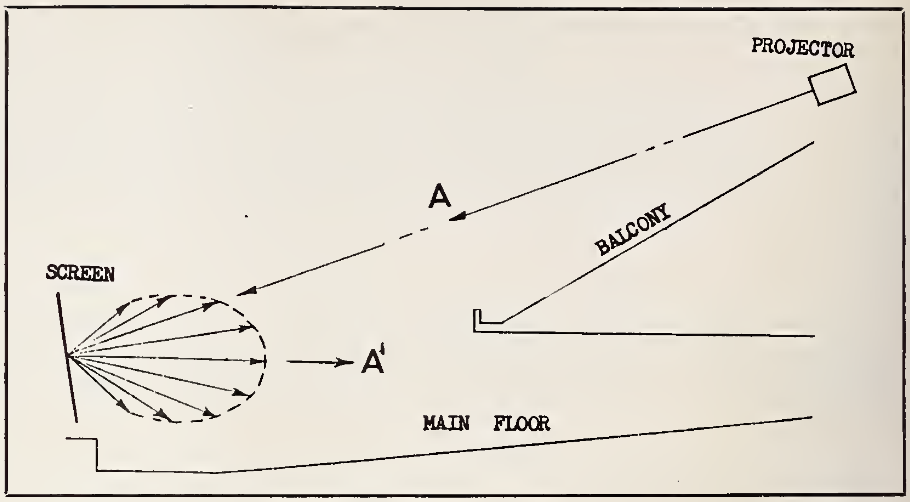


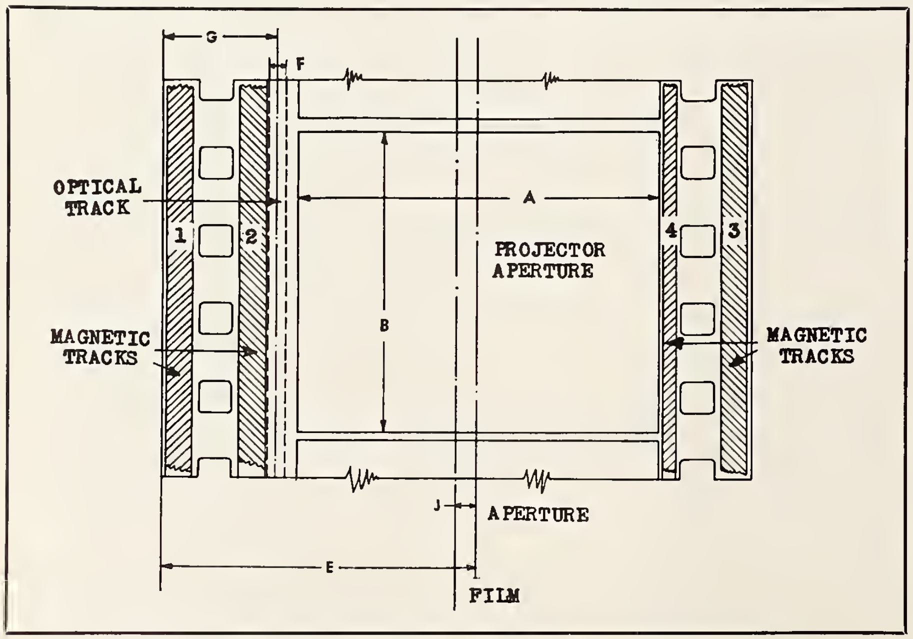

FIG. 2. Screen tilted.

### *Magoptical Prints*

Probably the most widely publicized development of the Research Council lately has been the Magoptical print. This came in answer to complaints of those exhibitors (mainly the small houses) who could not, or would not install magnetic sound equipment for CinemaScope presentations. The Magoptical print has now been adopted by most studios. (See IP for March, p. 21.) An offshoot of the Magoptical development has been the insistence of the major companies that small-tooth sprockets are essential projection equipment.

Under the aegis of Kelley, the Council has developed a number of test films, including those checking sound, flutter, scanning beam illumination, 3-track balancing, and fairly recently, an all-purpose projector alignment film.

The APAL, as the all-purpose test film is known, enables the projectionist to use it for CinemaScope in both 2.55 to 1 and 2.35 to 1 ratios, as well as standard ratios from 1.375 to 1 down to 2 to 1. Special targets provide for checking height steadiness, side weaving, squeeze ratio and focusing, and travel ghost—with or without anamorphic attachments.




Motion Picture Research Council's official diagram of the magoptical print.

### *Problems Present a Challenge*

The influx of new processes, the growth of drive-in theatres with its consequent problem of increased lighting, the question of various aspect ratios, various screen sizes—in short, the problems that the motion picture industry has inherited with its state of flux these past years, has provided the Research Council with its problems and its challenge.

The installation of special field representatives, the creation of local committees, and the general policy of going out into the field is enabling the Council to achieve that important goal of effecting a cooperative liaison between technician, exhibitor, and production. Realizing that it is no easy task to achieve, the Council feels that adoption of its recommendations are in the best interests of the industry.

## RCA's Quarterly Dividend

25 cents per share on common stock is the quarterly dividend for holders of RCA stock, the firm has announced. The board of directors has also announced a dividend of 87½ cents per share declared on first preferred stock for the period of April 1 to June 30, payable to holders of record on July 1.

## Allied Convenes October

The Concord Hotel at Kiamesha Lake, New York, has been selected as the site for Allied's national convention this year, which will take place the week of October 27. The selection of the Catskill Mountain resort puts a definite end to any prospect of a joint Allied-TESMA trade show this fall, although there had been discussions toward that end.

# Drive-In Projection: A Challenge

By ROBERT A. MITCHELL

**The second installment in this series includes a comprehensive list of instructions on preparation for the opening performance, with some pertinent warnings that will prevent future trouble.**

THE FIRST SHOW of the season is tremendously important to the projectionist working in a seasonal theatre, indoor or drive-in. All causes of breakdown must be eliminated, so far as possible, *before* the opening performance. Most seasonal indoor houses in the north open in the latter half of June; most drive-ins, on the other hand, are already in operation. But even if your own seasonal theatre is now open for business, it isn't too late to note minor projection and sound defects and to correct them to forestall serious trouble later on.

The drive-in projectionist's job is frequently complicated by the extra task of installing and adjusting the projection equipment a day or two before the opening. Mistakes made in this initial phase of the projection preparations may seriously impair that all-important first show. And the installation of new and more satisfactory equipment has been known to occur in seasonal theatres even in mid-season: exhibitors sometimes wake up to the fact that old, outmoded equipment is inadequate for presenting pictures and sound to modern, discriminating audiences.

In any case, it is always a good idea to get the film ready for showing even before the final adjustments are made in the projection and sound apparatus. *Never run prints directly off the shipping reels without prior inspection!* Take no chances with "black-outs" caused by film breaks! The film rewinder and splicing block will therefore be put in working order very early; and the reel of preview trailers will be assembled immediately after the shorts and feature film have been inspected and repaired.

### *Electrical Failure Precautions*

The first item to be checked is the AC power input and associated switches and fuse boxes. Especially note the location of the 3-phase fuse box which supplies power to the motor-generator set or rectifier. The fuse boxes are sometimes considerably scattered in indoor theatres, some being located in the cellar, some in closets on the ground floor, and others in a generator room or in the projection room.

As a precaution, place several spare fuses of the proper type and current-carrying capacity in or near each fuse box. If any unit suddenly goes dead during a show (i.e. if the projector motor stops, or the generator or rectifier goes dead, or the sound system fails), check the proper fuse box for blown fuses before examining the equipment in detail for electrical defects.

There are many other causes of electrical failure besides blown fuses, of course, as indicated by the following:

*Arc lamps dead.* (1) If the generator stops when the DC supply to the arcs fails, suspect blown fuses in the 3-phase line. (2) If the fuses are okay, check the relay switch, closing it manually, if necessary. (*Caution!* Voltages of 220-240 are dangerous! Because 3-phase AC seeks a ground return, avoid touching a current-carrying conductor.)

(3) If the generator continues to run when the DC line to the arcs is dead, check the generator output voltage. If the DC voltmeter reads "0," check the small cartridge fuses in the control cabinet. (4) If these are okay, check the field rheostat. *The generator will not generate current when the field-rheostat circuit is broken.* Restore generator output by short-circuit ing the rheostat terminals if the rheostat is broken. (5) If the generator voltmeter indicates normal output, examine the ballast resistors for broken wires and loose connections. Make certain that all lamphouse connections are secure.

*Arc-feed motor stops.* (1) If the carbon-feed motor stops, examine the fuse in the lamphouse fuse block. (2) If this is okay, examine the connections to the motor. (3) If feed motor merely binds, ascertain whether the entire carbon-feeding mechanism is binding. Lubrication of feed mechanism or motor may restore proper functioning of the lamp.

*Projector motor fails to run.* (1) If completely dead (i.e. does not even make a humming noise), check projector-motor circuit and switch. (2) If motor makes a humming sound, check projector mechanism for bind-ups and soundhead for film wrapped several times around a sprocket.

(3) Also check for open starting resistor or short-circuited capacitor. In such a case, if simple measures fail, try starting the motor by hand at the same moment the current is turned on. (Turn motor in correct direction!) To correct more serious motor troubles, refer to Chapter 19 of "Robert A. Mitchell's Manual of Practical Projection," the only projection textbook that gives complete motor-servicing data.

*Optical-soundhead exciter goes out.* The sound goes dead when the soundhead exciting lamp stops burning. (1) Check for burned-out filament. (2) Check fuse in exciter current supply. (3) Check bulb socket, switches, rheostat, and all electrical connections. (4) If exciter supply to one machine fails, connect by means of a 2-wire lamp cord to the connection block of the "live" soundhead. (5) If exciter supply to both machines fails, prepare to operate the exciters on AC, cutting

**Beware Spontaneous Combustion**

The recent fire at the Allied Artists exchange in Omaha has been attributed to spontaneous combustion in the film storage room. After investigation, fire officials estimate that the film decomposed in storage, generated heat, and released gases. The resultant action activated the sprinkler system throughout the entire exchange, and some film that escaped destruction by fire was ruined by water damage. A request may be made from all exchange branches for a report on the type of film stored, where it is stored, and dates of inspection.

down the voltage by means of a toy electric-train transformer. (See p. 13 of the August 1956 issue of IP.)

*Sound system goes dead.* (1) If tube filaments and exciters are lighted, but sound goes off suddenly, check all switches and the fader to see whether anything has been switched off accidentally. This has happened so frequently, we suggest a quick check of these points as a first step. (2) Check projection-room monitor by observing whether stage or ramp speakers are also dead. (3) Check soundheads by switching to non-sync. If "sound-on-disk" is obtained, replace photocells or check preamplifier connections.

(4) If tubes and exciters are lighted, and sound dies out gradually, replace tubes in the power amplifier (output stage), making sure that you have replaced them in their sockets correctly. (Haste makes waste.)

(5) If tubes are unlighted, check main amplifier fuses; and if these and all connections are okay, (6) replace rectifier tubes.

(7) If the sound system is operative, but no sound issues from the stage speakers, look for a broken speaker cable or a pulled plug backstage. (8) A dead ramp in a drive-in indicates a short circuit or broken cable. If a speaker fuse block is used, examine carefully for one or more blown fuses. As a rule, extensive testing is required to locate the cause of sound outage in one ramp, so disconnect that ramp from the power amplifier and shut down the show while the patrons, advised by an attendant, move their cars to a "live" ramp.

### Cool, Clear Head an Asset

The foregoing "emergency suggestions" represent minimum measures to be taken without undue loss of show time to restore units which have been rendered inoperative by electrical failure. More serious causes of trouble (such as a burned out arc rectifier) may require an emergency call to the service engineer and possible loss of box-office receipts. Records prove that most emergency calls result from amplifier trouble, however.

In any event, unnecessary trouble can be avoided if the projectionist resists the urge to panic when a breakdown occurs. We personally know of a case where the service engineer was summoned nearly 100 miles to restore sound in a system inadvertently switched from "film" to "disk."

Had the projectionist remained calm and alert, he would have restored the sound within seconds by making a systematic and intelligent check of all fuses, switches, and other components affecting sound output. The same trouble could conceivably have happened by an accidental switch to the magnetic-sound voltage amplifiers; but magnetic reproduction is not nearly as prevalent as sound-on-disk used for playing phonograph records before the shows and during intermissions.

### Installation Procedure

The projection equipment in most indoor seasonal theatres remains permanently installed. In many drive-ins, however, the equipment is removed at the end of one operating season and replaced at the beginning of the next season. This practice is sometimes necessary to protect the projectors, arc rectifiers, and sound amplifiers against the inevitable dampness of long, cold winters and raw, rainy springs.

The work of installing projection and sound equipment is simplified when the projector bases and amplfier racks are left in place. It might be a good idea to keep the following general instructions in mind for the next time you may be called upon to install theatre-projection equipment!

Every manufacturer furnishes instructions for the unpacking and installation of his own projectors, soundheads, and lamps. These should be followed as closely as possible when installing new equipment. The simple replacement, or re-installation, of previously used projectors, on the other hand, involves the following general steps:

#### A. Soundhead and Motor.

1. Attach the soundhead to the "main bearing bearing bracket" of the projector pedestal.
2. Attach the drive-gear bracket and motor to the soundhead.
3. Align the motor and gearing per manufacturer's instructions.

#### B. Lower Magazine.

1. Bolt the lower magazine to the bottom of the soundhead. (Attach a cable-clamp bracket to the bottom of the soundhead, if required.)
2. If the film takeup is driven from a pulley in the soundhead, place take-up belt on machine, making sure it is strong, free from oil, and as tight as you can get it. (This step will have to be deferred until C3 is completed when the takeup is driven from a pulley in the picture mechanism.)

#### C. Projector Mechanism

1. If an oil pan and mounting bar are used, fasten both to the bottom of the projector head.
2. Place mechanism on top of the soundhead, slipping the bolts in place and meshing the projector drive gear with the soundhead gear (unless the drive-gear assembly is to be installed afterward as a unit).
3. Tighten the 2 (or 3) mounting bolts, but avoid excessive tightness, which may warp the mechanism base.

*Warning!* Whenever the design of the soundhead requires that the mechanism be shimmed, place the shims as close to the projector mounting holes as possible. This will avoid slight warping of the mechanism base plate.

4. Attach electric changeover device to back of mechanism.

#### D. Magnetic Reproducer and Upper Magazine.

1. Install the CinemaScope magnetic soundhead, if such is used, on top of the projector mechanism.
2. Install the fire-valve box on the top of the projector head (unless a magnetic soundhead be used).
3. Attach the upper film magazine either to the top of the projector mechanism or to the top of the magnetic reproducer.

#### E. Electrical Connections.

1. Projector drive motor.
2. Optical soundhead. (a) Photocell to preamplifier. (b) Exciter to exciter supply.
3. Magnetic soundhead to 3 preamplifiers and sound-effects control, if used.
4. Projector head. (a) Framing light. (b) Automatic changeover.
5. Amplifiers. (a) To power supply. (b) To mixers and fader. (c) To power amplifiers. (d) To monitor speaker and to stage- or ramp-speaker distributing board.

#### F. Water Connections.

Connect intake and outlet tubing to

water-cooled projector gate.

### G. Arc Lamp

1. Install any necessary adapter brackets on the lamphouse table of the projector pedestal.

2. Place the lamp upon the adapter or directly upon the pedestal lamp table. *Lightly bolt into place before opening any lamphouse doors which may cause the lamp to unbalance and fall off the table!*

3. Move lamp toward or from the projector aperture to obtain recommended working distance. (An inch or so nearer the aperture gives more, but less uniformly distributed, light. An inch or so farther from the aperture gives slightly less, but whiter, more evenly distributed, light.)

4. Align the lamp optically in accordance with the manufacturer's instructions.

5. Install lamp mirror and condensing lenses. (To prevent accidental mirror breakage, it is recommended that this be deferred until after normal arc-burning conditions have been set.)

6. Electrical and water connections. Make necessary connections on the terminal block. Connect to 110-volt supply for blower motor and work light. Connect asbestos-covered arc cables to table switch (or if relay is used, connect relay switch to rectifier). Connect intake and outlet tubing to positive water jacket.

7. Ventilation. Connect the lamphouse vent pipes to the ventilating system, first making certain that the exhaust fan is in good working order.

### H. Generator or Rectifier.

1. Install motor-generator set or rectifiers and connect to AC mains per manufacturer's instruction manual.

2. Connect generator or rectifier output terminals with arc lamps, using insulated cable of adequate wire size (at least B & S size 0 for drive-ins), and interposing a ballast rheostat in one leg of each circuit (two rheostats in all) when a motor-generator set is used.

3. Connect the motor-generator relay switch and field-control cabinet. The correct electrical hookup for a 2-lamp installation supplied by a multiple-arc generator is shown in Fig. 1. Guard against shortening or lengthening ammeter leads.

### I. Miscellaneous Sound Equipment.

1. Speakers. Stage speakers in indoor theatres must be correctly phased, and medium- and high-frequency units positioned for maximum sound distribution without echoes and "wall slap." Drive-in post speakers should be individually tested for defects before being installed on the speaker posts. Stereophonic-sound speaker sets for Perspecta Sound and CinemaScope magnetic sound are best installed by installation engineers equipped to do the job in a minimum of time.

2. Non-sync phonographs. Install new needles of the correct type and test for reproduction quality.

3. Microphones. Announcement mikes should be tested for quality and replaced if incapable of natural voice reproduction.

### J. Screen.

1. Inspect the screen surface visually for discolorations, streaks, etc.

2. Brush indoor screens.

3. Repaint drive-in screens, if necessary.

## *Projection Make-Ready*

The projectors in a seasonal theatre are not ready for the opening show until they have been cleaned, mechanically adjusted, lubricated, and lined up optically. Although there are many details to command the projectionist's attention during the make-ready operation, the entire procedure may be outlined rather simply.

1. Carefully clean all lenses and anamorphic attachments, and note which aperture is to be used with each lens combination.

2. Clean the projector and sound mechanisms, wiping off any anti-rust or packing grease which may have been applied to exposed steel parts. Remove old oil from the gear side of the mechanism, using a medicine dropper and clean cotton rags (not cotton waste!) in the case of mechanisms not automatically lubricated. If gears are grimy, clean them with a stiff-bristled toothbrush dipped in kerosene.

*To avoid serious accidents, guard against oiling or cleaning a projector while it is running.*

3. Check all screws and taper pins, and note whether there are any worn or broken parts to be replaced.

4. Drain the old oil from the intermittent movement and replace the sprocket if the teeth are notched or otherwise worn. (A knife-blade passed along the underside of a tooth will click if a notch be present.) Readjust the movement if it runs noisily with-

(*Continued on page* 28)

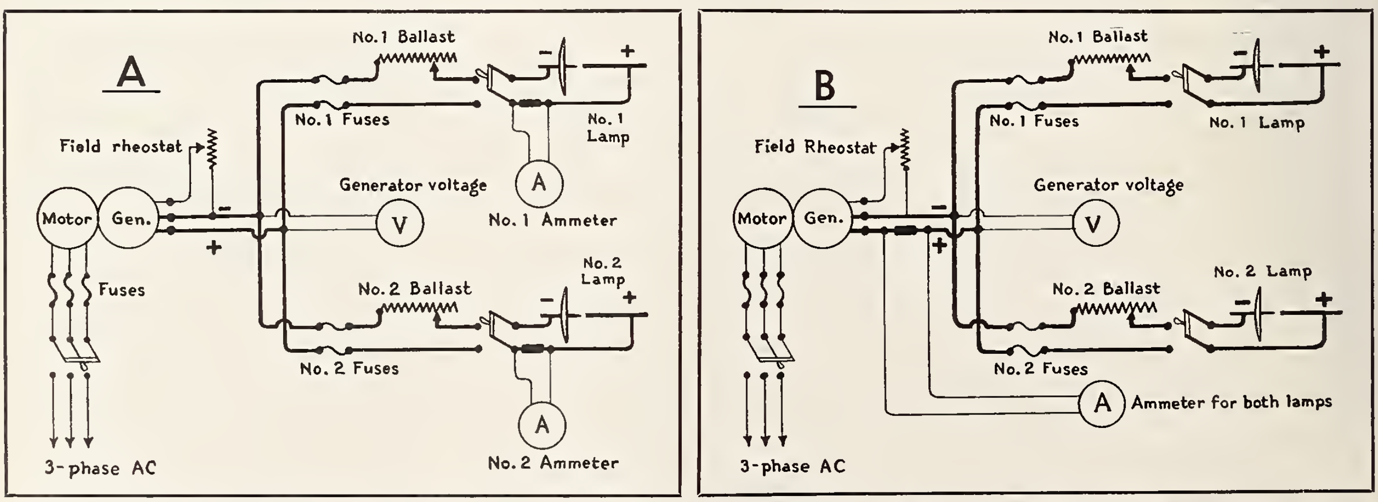



FIG. 1. Diagram showing the placement of meters in an arc-lamp circuit. (A) illustrates circuit having two ammeters, one for each lamp; (B) shows the alternative hookup employing one ammeter for both lamps.

**A considered suggestion that significant improvement can be made without a complete technological change.**

# Improvements Needed Other Than Standardization

By JOSEPH HOLT

Member, IA Local 428, Stockton, Calif.

FROM VARIOUS industry leaders there has been some talk concerning the need for standardization of technology. Talk is all to the good, but one of our crying needs today is for intelligent action toward the technical growth of motion pictures and less concern about uniformity.

For instance, it appears that some of the troubles which beset the exhibitor today are the result of a quarter-century of standardization, and it is significant that innovations in aspect ratio and sound presentation seem to have earned public approval largely on the basis of *difference.*

We would be the last to say that mere change is desirable in itself; it is our thesis that certain stories may lend themselves to huge all-engulfing screens while others require the more intimate and correspondingly smaller picture size.

But whatever the merits of a particular aspect ratio, it should be beyond argument that the adoption of one standard screen size for all product shown in the theatre is degrading to everything shown. A specific example will illustrate what we mean: the writer has seen several instances wherein all non-anamorphic prints are shown at a 2:1 ratio by using an aperture .412" x .824". Conversely, all squeezed product has been edge-cropped by the use of an aperture .715" x .715". The results, while meeting the first principle of standardization by picture dimension, are something which should bring shame upon all who allow such a condition to exist.

### *Severe Cropping*

The worst feature of the 2:1 aspect ratio on normal film is the severe head and toe cropping, and titles for the most part are either missed in part, or the projectionists must resort to a type of "roller-coaster roll" by framing up and down constantly.

Side picture loss on anamorphic prints is most serious, titles are also partly lost, and the standard visual cues are not visible due to excessive masking by the reduced aperture. This fault explains the presence of punched holes, scratches, pencil marks, and the like adjacent to perfectly clear standard cue marks. Thus a vicious and entirely unwarranted condition exists in the furtherance of uniform presentation.

The development of large-film processes seems to offer a reasonable basis for bringing order out of the existing situation. In the use of larger film in the camera, one such method provides greater resolution in the release 35-mm print, and allows the very largest theatre to use a picture aperture sufficiently large to provide remarkably improved screen illumination.

A second large-film scheme provides for the horizontal compression of the anamorphic scene in two steps. Half the squeeze will take place at the camera, and the other half will be accomplished at the time of printing.

The foregoing proposals indicate a sound grasp of the needs of the industry. The very large theatre and the drive-in must find means of raising the light on the screen without the extensive film damage which has been the result of previous efforts. At the same time, the subsequent-run and suburban theatre must have standard 35-mm prints which are sharp-focus and distortion-free.

Industry leaders need to take the time and study required to establish the point at which a shift to a higher scanning speed may be an advantage to most of the industry. We raise this question in view of the shift by one system to a 30-frame-per-second rate. Otherwise well-informed projectionists have made the statement to the writer that this shift has been made merely to render the product filmed at that speed directly compatible with television.

### *A Case for 30-Frame Speed*

Let the reader consider briefly the compelling reasons which would make a complete shift to the 30-frame speed advisable. In the first place, as the intrinsic light level of pulsed light is raised, there is a threshhold of visible flicker at some frequency. Beyond this level of illumination, the best way to reduce flicker is to raise the repetition frequency.

The reader will recall that present 24-frame practice is to scan each frame twice, thus producing a repetition rate of 48 cycles per second. The adoption of a 30-frame rate would raise this to 60 cycles, and would reduce inherent flicker as well as flicker caused by three-phase 60-cycle rectifiers.

The next advantage would be in the raising of the upper limit of sound recording, whether optical or magnetic, due to the increased lineal speed of the film.

There is no reason that a gear-transfer arrangement would be difficult to provide for most projectors in use, in order that 24-frame product could be used merely by the operation of a control lever.

In the brief space of this article we have demonstrated, we hope, that significant improvement can be made in the projection of motion pictures without a complete technological revolution. Efforts dedicated to the attainment of this general goal would be in the interests of the betterment of projectionists and all others in the motion picture field.

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## New Cinerama Production Unit

A new production and distribution company is planned by Cinerama, with an eye to utilizing the process in industrial, advertising, public relations, and government agency fields. First production on the agenda is "The Eighth Day," in cooperation with the Atomic Energy Commission. Background research has already been made. Operations will begin "when the Stanley Warner Cinerama Corp.'s exclusivity terminates," according to Cinerama president, Hazard E. Reeves.

**Two new anamorphic processes and a stereosound forum is the late news from our expert English contributor.**

# From the British Viewpoint

**By R. HOWARD CRICKS**

WITHIN THE LAST few days before these notes were written, two new methods of producing anamorphic prints have been announced. One has already been advertised in the trade press: it is Technirama. The other, developed by the Rank Organization, is known as Anamorphic VistaVision. (For further information on Technirama, see page 24 of this issue. —ED.)

The first system was devised by the Technicolor technicians over here, with the object first of producing a negative that could easily be adapted to the production of either anamorphic or wide-screen prints; second, to give a negative of increased sharpness by combining the principles of CinemaScope and VistaVision; and third (and perhaps even more importantly to Technicolor) to revive the inbibition process.

The principle is one that Dr. Leslie Knopp, technical advisor to the Cinematograph Exhibitors' Association, proved mathematically correct some time ago. First, the negative covers two frames; it runs horizontally in the camera, but the image is squeezed to a ratio of 1.5 to 1, instead of the CinemaScope 2 to 1. Then in printing, this half-squeezed negative can either be further squeezed to produce a standard anamorphic print, or unsqueezed to produce an Academy print.

The optical system used on the camera is a modification of the Delrama mirror anamorphic system which is widely used throughout Europe for projection, and is, I gather, not unknown in the States. (Delrama is designed, patented, and manufactured by the Old Delft Optical Co. in Delft, Holland. Delrama IV is marketed in this country under the name of Vistascope—ED.) A special model has been devised giving the 1.5 to 1 compression, and large enough to handle the wide angle of the VistaVision lens. Frank Durban, of J. Frank Brockliss Ltd., was one of the principal perfectors of this system.

Basically the Delrama consists of a couple of reflecting surfaces arranged like a periscope, but instead of being flat they are curved to produce the squeeze effect. Adjustment between them is needed to allow for focusing. Actually, in the model used for Technirama, reflecting prisms are used instead of mirrors, but the principle is the same. (See Fig. 1.)

### *Fine Technirama Definition*

The first film to be made in Technirama is "Monte Carlo Holiday," photographed in Italy and released in this country by United Artists. At the trade show I was very impressed by the fine definition—better in fact than that of the black-and-white material in the same program. But ten days earlier, I had, by courtesy of Sir Michael Balcon, seen color pilots of a new Ealing film, "Davy," also made in Technirama, and found the definition even better.

Anamorphic VistaVision has been developed chiefly in the Rank Laboratories. The camera is standard VistaVision, producing an unsqueezed negative. From this negative a 35-mm print is made, standard except that it is squeezed to a ratio of 1.5 to 1. It projects at an aspect ratio of 1.75 to 1, and the frame is the same size as CinemaScope optical, the prints having an optical track. The printing process involves no cropping of the frame in either direction, so that everything the cameraman photographs can be projected.

Non-standard—so it is. But back in the days when most people were working on cylindrical lens anamorphs, Taylor, Taylor & Hobson, now a Rank subsidiary, produced a prismatic system, the Varamorph, which, as its name implies, permits the squeeze ratio to be varied. (The difference between this and the Delrama is illustrated in Figs. 1 and 2.)

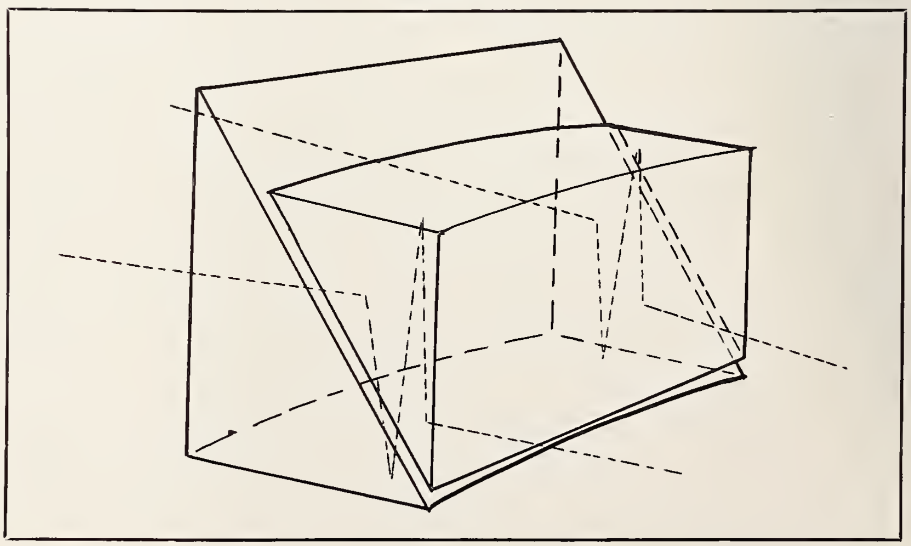
Standard Academy prints will continue to be available for all Rank films, but the obvious advantages of anamorphic projection—chiefly the increased amount of light on the screen—will ensure the owners of Varamorphs preferring the new system.

Just at this writing I am informed that Technirama is to be officially unveiled to the trade on or about May 20, by the showing of a specially compiled demonstration film. ("Monte Carlo Holiday," the first Technirama production, was supposed to bow in this country in January, but no Technirama production will be released here until somewhere between May and August, according to Technicolor, which is backing the process—ED.)

## ACOUSTICS FOR STEREO SOUND

CinemaScope sound has brought about a direct conflict of opinion on the subject of acoustics: does stereosound need more or less acoustic

FIGURE 1.



treatment in the auditorium than single-channel sound?

As far back as 1946, a committee of the British Kinematograph Society reported that "The installation of more modern reproducer equipment, or the introduction of stereophonic sound, will not of itself materially alter fundamental requirements, but rather make their satisfaction more imperative."

A few months ago, the BKS had a paper by John Carson, sound engineer for Rank cinemas, who described the practical task of providing acoustic treatment—a task necessitating in the case of one theatre no less than 12,000 square feet of Paxtiles. Said Mr. Carson: "The gradual introduction of multi-loudspeaker systems will make acoustic requirements more exacting."

Let me interpolate an explanation: a major factor is that most of our larger cinemas were built in the years just before the coming of sound, when nobody knew or cared about acoustics.

In Carson's paper a number of references were made to the work of J. Moir and his colleagues, of the British Thomson-Houston Co. In the next issue of *British Kinematography*, following the report of Carson's paper, appeared a letter from Mr. Moir, who expressed the opinion that with stereo reproduction, "The acoustic conditions of the auditorium should be less critical . . . The main enemies of stereophonic sound are the studios themselves, for they turn out too many films which are stereophonic only in the ad-writer's imagination."

### *BKS Open Forum*

Aware of this conflict of opinion, the editor of IP asked me to comment on it. It so happened that an Open Forum of the BKS was held recently, and I took the opportunity of raising the question. I expressed the opinion that to produce a stereophonic effect it is essential that the listener should be able to detect from which direction the sound originates, which means that he must be able to hear a considerable proportion of direct sound from the speakers, not masked by repeated reflections.

It was fortunate that among those present was Mr. Loren F. Rider, now of 20th Century-Fox, a former Western Electric engineer, who played an important part in introducing CinemaScope in this country. He was inclined

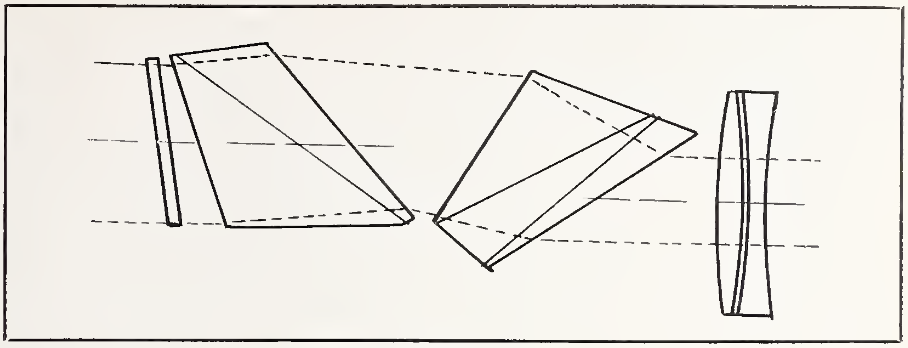


FIGURE 2.

to agree with Moir's view; binaural hearing, he said, enabled one to distinguish better between different sound sources, and the same applied to to stereophonic reproduction; the use of several speakers also overcame standing-wave patterns.

He further pointed out that if in a large auditorium absorption were excessive, there would would be a difficulty in sound distribution, the volume needing to be kept high so that those in the front seats would be deafened.

Among other speakers was Mr. N. Mole, of Associated British Cinemas, who, while generally agreeing with Mr. Rider, suggested that such problems could be largely overcome by correct positioning of the high-frequency speakers.

When experts fall out, who shall decide? Personally, I find that in a large portion of cinemas, stereosound is ineffective in a small part of the seating area. When I can hear directional sound in a reasonable proportion of theatre seats, without excessive acoustic treatment, I will be willing to admit my error.

## PROJECTION ANGLE

Alongside this problem of acoustics, modern projection techniques with their enormous curved screens have accentuated the problems of projection rake (angle). It is pretty obvious from their voluminous instructions on cutting aperture plates that 20th Century-Fox found the same difficulties in American cinemas when CinemaScope was introduced.

We still have a number of cinemas where this problem is serious—largely, of course, former music-halls or legitimate theatres; keystone mask-plates have always been needed in such cinemas. A merit of the projection type Delrama is that it can be so adjusted as to correct picture distortion — curved horizons, converging verticals —when a picture is projected with a steep angle upon a curved screen.

I would not like to say whether or not it is coincidence that one hall in London built as a cinema, but nevertheless having the projection room situated way up in the dome, is now in course of demolition—the Tivoli, successor to a world-famed music hall.

## Altec Completes Outstanding Sound Installation

The unveiling of the ultra-modern twin motion picture theatres in historic Williamsburg, Va., recently marked the first use of a complete Altec sound system designed to special specifications. David L. Demarest, Altec engineer, was the technical supervisor of the operation, which was conceived and fabricated in the New York laboratory and workshop of the technical firm.

Under Demarest's direction, field engineers Frank Evans and Harry Hornbeck installed a multi-channel magnetic sound system, in conjunction with specially designed VistaVision screen and projection equipment. The process is said to envelop the audience in sight and sound. Principle of the twin-theatre construction is to furnish both theatres with one projection room, eliminate all possible distractions, and have every seat in the house as near a perfect seat as possible. The screen is almost semi-surround.

An invitational premiere was held on March 30, attended by a number of notables from all parts of the U. S.


Love me . . . love my dog!
Romance for everyone on the wide wide-screen
Dreams come true for everyone . . . when the neighborhood show goes on! There—free from the cares of home—dad's a hero; mother's everything she'd like to be. Big screens, new technics, help do this to people.
With all this has come new problems of production, processing and projection—problems which the Eastman Technical Service for Motion Pictures is daily helping the industry to solve. Inquiries invited.
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130 E. Randolph Drive
Chicago 1, Illinois
West Coast Division
6706 Santa Monica Blvd.
Hollywood 38, Calif.

The function of this department is to provide a forum for the exchange of news and views relative to individual and group activities by members of the organized projectionist craft and its affiliates. Contributions relative to technical and social phases of craft activity are invited.

# In The SPOTLIGHT

THE FORTHCOMING — June 13 — meeting of the famed 25-30 Club promises to be one of the Club's most outstanding gatherings of the season. Scheduled for this meeting is a practical demonstration of the new water-cooled curved film gate designed for the Simplex XL, to be followed by an open question and answer forum. The forum will be presided by several top technicians from International Projector, manufacturer of the Simplex XL.

Representing the company at this meeting will be Arthur Meyer, vice-president in charge of sales; Barney Passman, vice-president in charge of engineering, and Willy Borberg, designer of the Simplex XL projector. National Theatre Supply Co. will be represented by Walter Green, president; William Turnbull, vice-president in charge of sales, and Allen Smith, New York City branch manager.

• With a membership of only 39, IA Local 744, Cadillac, Mich., has jurisdiction over an area having a radius of 150 miles. It seems like of lot of territory for a single Local to cover, but most of it extends to outlying country where motion picture theatres are few and far between. The officers of Local 744 are very proud of this coverage and they claim to hold the record for cover ing a larger area than any other IA Local in this country.

• Donald F. Lutton, secretary of Local 266, Jamestown, N. Y., takes exception to a statement appearing in the exhibitor trade press attributed to Gerald Shea, president and manager of the M. A. Shea Enterprises. The Shea circuit is comprised of 42 theatres located in Ohio, Pennsylvania, New York, Massachusetts, and New Hampshire.

In an article featuring new economies of theatre operation uncovered by the circuit's managers, Mr. Shea was quoted as stating that no employee salary cuts were made in the new economies—"I don't believe in them." The following excerpt from a letter to IP from Donald Lutton is somewhat at variance with the aforementioned statement:

"This Local was asked to take a 25% pay cut at Shea's Pic 17 Drive-In, and after negotiations the Shea representative offered us an ultimatum of a *15% cut* or be replaced by a non-union projectionist. In view of the fact that our men work in this business to make a living wage and not for extra money, we had to turn this offer down. The Drive-In then hired a scab projectionist who is an expelled member of our Local."

• The IA has issued a Local-Union charter, No. 867, to the Society of Language Specialists, a group composed of translators, dubbers, narrators, commentators, program directors, and news editors in the foreign language field. They are employed chiefly by the export subsidiaries of the major film distributors, as well as radio stations.

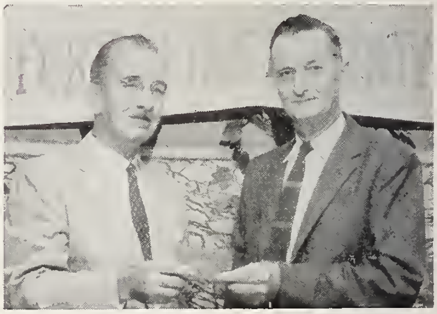
• Cinema workers in Northern Ireland rejected a 5% wage hike offered by exhibitors. William McCullough, officer of the National Association of Theatre and Kine Workers, is asking for a 10% raise for workers earning more than $21 a week and 15% for those earning less. The case is now before the Northern Ireland Ministry of Labour.

• Harry H. Abert, member of Local 486, Hartford, Conn., and projectionist for the last 27 years at Loew's Palace in that city, has retired.

• Harold C. Graffius, secretary for Local 718, Philipsburg, Penna., is the new owner of the Rowland Theatre where he

## ALEXANDRIA (LA.) LOCAL 400 OBSERVES 41st ANNIVERSARY

A banquet at the famous Herbie K's Oyster House in Alexandria marked the recent celebration of the Local's 41st anniversary. Highlight of the evening was the award of a gold life membership card to Stewart E. Wilson in appreciation of 35 years service as Local secretary. Photo on right shows Albert S. Johnstone (left), IA vice-president, presenting the card to Wilson.



Pictured above are officers of the local flanked on the left by Johnstone and on the extreme right by R. E. Morris, IA trustee. They are, left to right: Wilson; W. Martin Lipscomb, business representative; J. Earle Dupree, president, and M. J. Angorola, vice-president.

# News and Views from District No. 2

**By HANK BOLDIZSAR**

Member, IA Local 150, Los Angeles, Calif.

*Among other things, the author tells of a behind the scenes tour of the fabulous Disneyland Park*

WALT DISNEY brought to the world a new name and with it a new form of entertainment that has thrilled and delighted the young at heart since it first opened about two years ago. "Disneyland," a fabulous dream come true, is not only a land of fun and fantasy but is also an electronics technician's paradise, containing some of the most interesting and unusual sound, stage, and projection assignments. Located in the rapidly growing city of Anaheim, just off the Santa Ana Freeway, Disneyland is in the jurisdiction of IA Local 504, Santa Ana, Calif.

Brother Ralph Adams, business representative for Local 504, took me on a personally conducted tour of the park. I met him at 10 o'clock one fine morning and we began our long trek down Main Street of this fabulous dreamland —the Main Street of the colorful years after the turn of the century. The park personnel are dressed in the style of that period.

In the shops and restaurants along the street one can listen in on the neighbors' phone conversations with "ye olde" ring-it-yourself party line telephones. Speech for these phones is produced by Mackensie repeaters running continuous (loop) tape: 78 of these repeaters are located throughout the park and provide the sound effects for the many rides and tours. A control room on Main Street houses the Mackensie repeaters and Ampex tape reproducers which produce the street music for the area. The Ampex units are self-reversing and operate 12 hours daily.

### *Disneyland's "Nickelodeon"*

Main Street is not without its cinema, but in keeping with the era it is a "Nickelodeon." Here, in a circular auditorium, the visitor may see six different motion pictures running simultaneously and featuring such stars of yesteryear as Valentino, Pickford, Fatty Arbuckle and others popular in the early days of motion pictures. Six separate screens are employed, each one recessed in its own miniature stage with curtains, drapes and brass rail. Each feature runs 15 minutes and is loop-wound for continuous run.

We entered the projection room via the roof and met projectionist Bill Johannsen, member of Local 503, Mitchell, S. Dak. This most unusual projection room features a projection bay in the floor (center) with the floor of the bay about three feet below the level of the projection room floor and one foot below the ceiling of the theatre. The six Eastman Pageant 16-mm projectors are mounted in this bay and project through ports located a few inches below the ceiling. Throw is approximately 12 feet for a 4-foot picture. These Eastmans run continuously twelve hours per day and, except for the motors, require no lubrication since the gears are made of nylon. The 8 Pageants (including 2 spares) installed when the park opened in July 1955 are still in operation.

Life of a print is about three months with 48 runs per day. The film has a plastic base and is removed every two weeks to be cleaned and waxed. Since plastic film is very sensitive to temperature and humidity changes a humidifier was installed in the bay to cool the area with moist air. When the film runs hot and dry the loop begins to take-up square, gets noisy and cannot track properly over the guides.

### *Projection Installations*

Next on the agenda were visits to the very interesting installations for "Circarama" (American Motors), "The World Beneath Us" (Richfield Oil Co.), and the "Trip to the Moon."* Many of the projectionists working these shows are out of town IA men. Brothers Justin Gilbert, Hollywood Local 683, and Lou Thomas,

*Described in IP for Sept. 1955: "Circarama: Spectacular 16-mm Presentation at Disneyland."

(*Continued on page 27*)

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has worked as projectionist for the past 30 years. Graffius is one of the organizers of Local 718.

• A new booklet on the merged labor movement, "American Labor's New Unity —AFL-CIO," has been distributed to workers in 80 countries overseas. This pamphlet, which describes trade unionism in the U.S. up to the present time, with emphasis on the merger and the events leading up to it, was published and distributed by the U.S. Information Service.

• The license fees for drive-in theatres in the province of Alberta, Canada, have been reduced by 50%. Drive-ins having a 500-car capacity now pay an annual fee of $125, or a monthly fee of $25, whichever is cheapest for the theatre. The fees decrease according to the car capacity of the drive-in. A. W. Shackleford, president of the Alberta Theatres Association, expressed gratitude to the Provincial Government for "recognizing the inequity between fees for drive-ins and those for indoor theatres."

• Edward L. Turner, secretary of Local 299, Winnipeg, Canada, was recently hospitalized for surgery. Although he had a rough time of it for a while, we are happy to report he is now on the mend.

• The AFL-CIO Union Industries Show will be held at the Municipal Auditorium at Kansas City, Mo., May 16 through May 21. This show, as in past years, will be sponsored by the Union Label and Service Trades Dept., and it is predicted that this year's exposition will top all others.

• The 17th North American International Photographic Exhibit, under the direction of the California State Fair and Exposition and the Sierra Camera Club of Sacramento, will be held August 28 through September 8 of this year. For further particulars write to the California State Fair and Exposition, P. O. Box 2036, Sacramento, Calif.

## CRAFTSMEN ABROAD

**In keeping with the international policy of IP, from time to time we like to introduce some of our fellow-members from across the waters. This month meet R.R.E. Pulman, projection engineer of Circuits Management Association, which operates the theatres of the Rank Organization in the British Isles.**

R. R. Pulman, projection engineer, Circuits Management Ass'n.

**Originally a projectionist in the other branch of the organizations which combined to form the CMA, Provincial Cinematograph Theatres, he is a former vice-president of the BKS. The son of a theatre manager, his chief regret is that his duties keep him occupied with paper work when he would much sooner be handling a projector.**

# TELECASTS

## Telemural Projector—RCA's Newest Advance

PROJECTIONWISE, the news in TV is the recent announcement of RCA's Telemural Projector. Equipped to show either black-and-white or color, the compact, portable mechanism is designed for simple operation. With a recommended projection angle of 20 degrees from optical axis to floor line, it can show color TV pictures up to $4\frac{1}{2}$ x 6 feet, black-and-white to 6 x 8 feet with commendable definition.

The Telemural apparatus utilizes three side-by-side Schmidt optical systems with three $2\frac{1}{2}$-inch projection kinescopes. A set of three kinescopes (yellow with red filter, blue, and green) take care of color operation. Three black-and-white kinescopes are used for monochrome operation.

Designed to operate from a standard NTSC video input signal, the Telemural projector is claimed to be easy manipulation for the projectionist. Once the projector is set up optically and electrically, only minor touchup adjustments have to be made. Controls and adjustments are readily accessible to the operator. For setup adjustments, a protective hood on the unit opens forward on hinges, revealing the optical assembly.

Accommodating audiences up to 400 for color TV, 800 for black-and-white, the recommended maximum throw distance is 17 feet. There is a self-contained $2\frac{1}{2}$-watt two 8-inch-speaker sound system, with provision made to supply audio signal to an external amplifier and speaker layout, such as a common p.a. system.

From a light output standpoint, with maximum throw, effective highlight brightness for color projection is 1 foot lambert, 2.5 foot lamberts for monochrome.

The RCA Telemural Projector, Type TLS-50/51. Visible are the three side-by-side Schmidt optical systems.

The recommended screen size is $4\frac{1}{2}$ x 6 feet for color, 6 x 8 feet for black-and-white. Power input requirements are 550 watts at 115 volts ±5 volts, 60 cps.

The RCA projector is groomed for educational, medical, industrial, and military information usage. For larger audiences, a number of Telemurals operating from closed circuit may be utilized to permit simultaneous viewing at different locations.

## Closed Circuit Boom

ASIDE FROM cable theatres, the recently demonstrated Telemeter—Paramount-backed home movies—and various other schemes, devices, and brainstorms, closed circuit TV in the industrial, educational, and medical fields has been growing and growing until now it almost dominates the visual instruction field. (Although the 16-mm audio-visual people say they aren't worried.)

Probably one of the most important uses of closed circuit TV is its use to provide immediate comparative data of chemical activity within live normal and cancer cells. The developmental RCA ultra-violet-sensitive TV camera tube is being used with a microscope and oscilloscope to obtain direct observations and measurements of the metabolism of living cells. This makes possible microscopic study and analysis of hundreds of living cells in only a fraction of time formerly required.

In a newsworthy sense, the installation of the new $400,000 closed circuit TV system in Pennsylvania Station in New York City has prompted other member RR companies to take notice. Once again, the Dage TV division of Thompson Products (see above) did the installation. The system allows a ticket clerk to see at a glance a train availability schedule. It utilizes 105 Dage cameras, 101 monitors, and projection equipment.

RCA, ever mindful of keeping its sales staff alert, has installed closed circuit equipment for a sales education program. "Tele-Sell," by which the program is known, is being produced by the TelePrompter Corporation and Jam Handy. It enables an illustrative salestalk to reach RCA points as far south as Jacksonville and as far west as Dallas.

The Society of Motion Picture and Television Engineers has taken cognizance of the importance of closed circuit TV, and at their recent convention in Washington considered plans on a closed circuit committee. Purpose of the committee would be to define terms, make recommendations and prepare specifications in the areas of operation, maintain and service TV receiving equipment for large screen projection systems, study screen characteristics, screen dimensions, seating arrangements and viewing requirements, and technical considerations in program origination for group viewing.

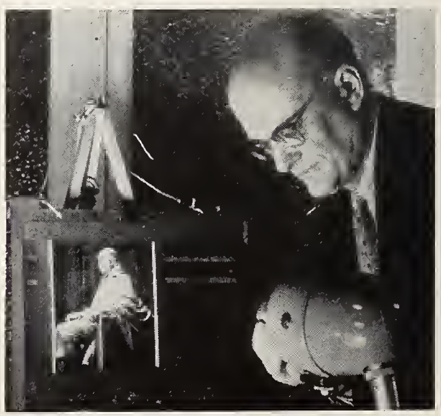
Probably the added fillip is the following item from the *NY Daily News*, April 10. In its entirety:

"'Strictly as an experiment,' a five-pound midget TV camera, its eye focused on the pass gate, has been installed on the southbound platform of the 42nd St. station of the Eighth Ave. IND subway line, the Transit Authority admitted reluctantly yesterday. The camera is hooked up to a receiver in the change booth so that the station master can look over everyone who uses the gate. The camera was installed without charge by the General Precision Laboratory of Pleasantville as a demonstration of the possibilities of TV in combating crime."

Closed circuit TV has arrived, but it's still suspicious.

## Telephone-TV Pairing

BELL TELEPHONE, which is usually somewhere in the background whenever new advancements in electronics are made, recently announced the result of experiments in transmission of narrow band TV pictures with motion over



C. Raymond Kraus of Bell adjusts the TV camera for transmission over narrow band, telephone cable facilities.

ordinary telephone cable pairs. Results, according to C. Raymond Kraus, general staff transmission engineer for Bell, were satisfactory.

Developed in cooperation with General Precision Laboratory and Dage TV division of Thompson Products, Inc., the narrow-band frequency admittedly results in pictures of "somewhat less resolution" than a regular broadcast transmission, but since the application of the system does not require picture quality (traffic control, etc.), this is deemed negligible. Or, as Mr. Kraus somewhat wryly puts it: "Obviously, in the remote viewing of the output of a steel rolling mill it is not necessary to be able to distinguish the ripple in the workman's overalls. And in viewing street traffic flow, it is necessary to see only the vehicles, not the ripples in their fenders."

Narrow band TV employs a frequency bandwidth of only 250,000 cycles, as compared with the 4,000,000 cycle bandwidth presently employed in standard broadcast. Main point of the narrow band system is economy: current requirements for video cable, microwave equipment, or coaxial cable—all expensive—is avoided. And current video pairs installation requires pulling special underground cables, whereas for narrow band TV, existing cable pairs already in place can be utilized with but minor changes; although in the designing and development phase it was necessary to produce special attenuation and phase equalizer circuits and amplifiers for the new system.

Thus far, using standard telephone cable facilities for transmission the new system operates successfully up to 10-15 miles, but further development work is expected to extend this range.

## Videotape to the Rescue?

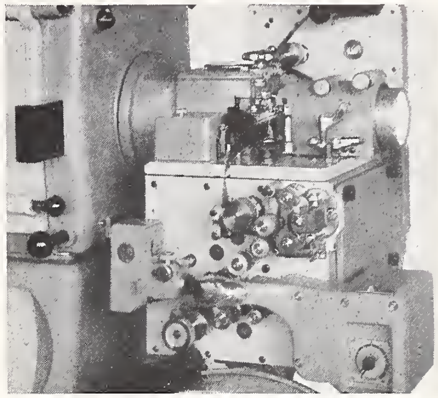
THE TV INDUSTRY, admittedly having had a mediocre year, has found itself embarrassingly in the same position as its competitor, motion pictures, in that it, too, is seeking and developing new processes to hypo a lagging public interest. (One of the bigger shocks was the blasé acceptance of color TV by the viewers, despite almost frenetic advertising.)

Of interest to technicians is the recent onslaught of tape recorded TV, which has pyramided since its nationwide debut at the presidential inauguration. (See telecasts, IP, February, 1957.) At the moment some twenty major programs are taped, and more to come. Since it is all but impossible to distinguish between a taped show and a live performance, tape may very well be the end of kinescope, which is unsatisfactory at best.

Now that the transistor has made the small portable TV camera possible, and tape is prepared to transmit color TV, tape is definitely in. Significant is the fact that Ampex received the Emmy award for development of the Ampex Videotape Recorder, named the most outstanding technical achievement in the TV industry during 1956.

# Technirama Process Debuts In Italy

IN ORDER to reduce negative grain and provide perfect definition both horizontally and vertically without distortion, the Technicolor Corporation has devised the new Technirama system for its color prints. Expressly designed for the projection of Technirama prints is the new Micronlambda projector manufactured in Turin by the makers of the well-known Microtecnica line of cinema apparatus.



Technirama soundhead

Interesting to projectionists is the *combination* of Paramount's "lazy-8" 35-mm wide-frame system of photography (VistaVision) and the 20th Century-Fox anamorphic process (CinemaScope) inherent in Technirama. The film not only passes *horizontally* through camera and projector in the Technirama process, but is also compressed in photography and expanded in projection by anamorphic lenses. Instead of an expansion factor of 2, however, as in CinemaScope and SuperScope, a factor of 1½ is employed for better image definition and reduced distortion.

The new Micronlambda projector for Technirama employs a projection aperture having the dimensions 36.11 mm × 22.38 mm (1.421" × 0.818"), providing nearly 800 square millimeters of area. This is the same as the VistaVision "lazy-8" aperture, except for the decreased picture height of Technirama to accommodate the sound track. It amounts to twice the area of the *standard* 35-mm soundfilm aperture, with a corresponding decrease of negative grain or dye blur in imbibition prints. With an anamorphic expansion factor of 1½, this aperture gives an aspect ratio of 1.614 × 1.5 = 2.4, very nearly.

### *New Intermittent Mechanism*

Unlike the modified Century projector for horizontal VistaVision prints, the Micronlambda mechanism has been completely redesigned to eliminate all flaws that might conceivably be caused by 35-mm film running horizontally with an 8-hole pulldown by the intermittent sprocket. This included a whole new geneva intermittent mechanism, shutter system, and film path with specially designed sprockets and idlers.

The optical system, also, has been designed with the requirements of the large Technirama film frame in mind. Special "fast" lenses having wide-field characteristics for sharp corner-to-corner focus are used in conjuction with mirror anamorphics of the Delrama type. It is claimed that definition with mirror anamorphics is superior to that obtained with lens-type anamorphics. Obviously, mirror anamorphics are free from chromatic and certain other aberrations afflicting cylindrical lenses.

The first Technirama film production, "Monte Carlo," stars Marlene Dietrich and Vittorio de Sica. It had its world premiere at one of the largest Italian cinemas, the 3000-seat Reposi Theatre in Turin. It is reported that technicians attending this showing were favorably impressed by the clarity and brilliance of the picture projected upon the 21 meters × 8.75 m (68.9 feet × 28.7 ft.) Technirama screen.

## 34,831,000 Drive-In Attendance

34,831,000 persons attended outdoor theatres in the year extending from November of 1955 through October 1956, according to statistics compiled by Sindlinger & Co., business analysts. This figure comprises 30,919,000 adults, and 3,912,000 children. Compared to a $400,000 outlay by the public in 1946, last year paid admissions totaled $273,416,000, and drive-ins are now claiming 21 per cent of box-office revenue for the industry.

Maintaining a continuous census of theatre operations, the Sindlinger firm noted the predominance of males over females in attendance.

An optimistic future for drive-in operation is held by the analysts. In 1946 there were 300 ozoners; as of the beginning of this year, there is an estimated 4,384 in operation. Considering presently known construction plans, by mid-summer of 1957 there will be 4,800 outdoor houses in operation.

What Is YOUR Problem?

# Projection CLINIC

## A & B Roll Method

*What is meant by the "A & B roll method"?*

HOME-MOVIE enthusiasts often add a professional touch to their films by using "fade attachments" on their cameras. At the press of a button, an iris-shutter slowly closes over the lens, fading the scene out; and at another touch, the following scene fades in. By winding the film back to the beginning of a fadeout while the lens is kept covered, the effect of a "lap dissolve" is produced.

Fades and dissolves are not produced on the camera in professional movie-making, however. Because the scene photographed by one camera is frequently dissolved into a scene photographed by a different camera, this work is done in the processing laboratory.

Fadeouts and fadeins are made by slowly closing and opening an iris-type shutter on the printing machine when the internegatives are printed from the master positives. Since a fadeout is represented by clear (white) film on the internegative, a fadeout and fadein may be spliced together in overlap to produce a lap dissolve. This was the old way—still used, but largely superseded by the A & B roll method.

The master positive is made up into two corresponding rolls, certain scenes being in the "A" roll, and alternate scenes, or groups of scenes, in the "B" roll. Accurately measured lengths of opaque (black) film are inserted between scenes so that a foot-to-foot correspondence is maintained throughout.

### *Automatic Cuing*

The printer is automatically cued for fadeouts and fadeins by means of notches cut into the edge of the film. By timing a fadeout on roll A to start at the point where a fadein in roll B begins, a dissolve is obtained. Roll A is printed first, the internegative raw stock is then rewound and threaded up again on the starting frame, and roll B is printed on the same stock. The scenes which were printed from roll A are represented by black film in roll B, and *vice versa*, hence there are no "double exposures" except during dissolves, "wipes," and in superpositions (as when a scene of which an actor is thinking is superimposed over his closeup).

One of the advantages of the A & B roll method is that it gives dissolves without splices or noticeable contrast-change effects. It works excellently in color-film production.

## Cleaning Lenses

*What is the best way to clean projection lenses?*

PROJECTION objectives and anamorphic attachments "wear out" only through cleaning which is too frequent and too careless. This is particularly true of coated lenses because the antireflection surface film of magnetism fluoride is exceedingly thin. Since the thickness of the coating is adjusted for a minimum of reflection losses at the wavelength of maximum visibility (yellow-green), coated lenses have a violet-purple sheen. Violet purple is *complementary* to yellow-green.

There are a large number of things to avoid when cleaning lenses of all types. Avoid vigorous scrubbing if you don't want to "frost" the surfaces! Don't use cloths of wool or silk—they are scratchy and greasy. Avoid commercial soap powders, as they often contain gritty particles and glass-etching alkalies. Avoid silicone-impregnated cloths and papers —the silicones are image-fogging greases which seriously impair the functioning of antireflection coatings. Avoid as much as possible the use of such organic solvents as alcohol, acetone, naphtha, and carbon tetrachloride. Not only do some of them contain dissolved greasy and waxy substances, but they may "eat" through lens gaskets and blister lens-cementing compounds.

To quote from "Coated Lenses: Nature and Care" by A. E. Murray of the Bausch & Lomb Optical Co. (IP for February 1949, p. 7 *et seq.*):

"Even such a bland substance as face powder is capable of producing scratches sufficient to destroy the fine polish laboriously applied at the factory. Individual scratches exert a negligible effect, but multiplied many times over so as to cover the entire lens surface, they can be disastrous to good imagery and contrast on the screen. . . .

"The use of alcohol is the most drastic treatment to which lenses can be subjected, and is always attended by considerable danger. A manufacturer just cannot recommend solvents for the cleaning of his lenses, even in the most skillful hands, and he is fully justified in refusing responsibility for any damage resulting therefrom. . . .

### *Mild Soap and Water*

"If water does not do the trick . . . the next strongest agent, and the last that can be recommended, is copious

(*Continued on page* 26)

## Nathan Golden Receives French Legion of Honor

Nathan D. Golden, director of the Scientific, Motion Picture, and Photographic Products division of the Department of Commerce, has been awarded the Cross of Chevalier in the French Order of the Legion of Honor. The high decoration was given Golden for his outstanding services in promoting cultural relations between France and this country through the promotion of the principle of two-way trade between the American and French motion picture industry.

A member of Local 160, Cleveland, Ohio, before entering government service in 1926, Golden was associated with the General Film Co., Mutual Film Co., Loew's Inc., Miles Amusement Co., and other theatrical enterprises in Cleveland. He is also a member of the Bar of the District of Columbia and the United States Supreme Court, a veteran of World War I, in which he was wounded at Verdun.

In his extensive travels overseas, Golden has promoted the idea that the exchange of films between two nations was the best means of effecting an understanding between those two nations. He has always believed that international trade in motion pictures was a "two-way street," and to that end he has encouraged international film exchange.

# Projectionist License Exam Questions

THE PRACTICE of most licensing examination groups is to make the examination progressively harder. Since we assume that all who assailed this test last month have passed with 100%, here is a new conglomeration to nettle you. Correct answers on page 24.

*1. The length of film remaining on a reel being run off should be determined by:*

(a) opening the upper magazine door; (b) looking at the footage counter or through the glass door of a magazine; (c) opening the lower magazine door. (d) timing the run-off with a stop-watch or second hand of a clock or watch.

*2. How would you determine after striking the arc whether it operated on direct current:*

(a) see if both carbons cool off at the same rate after the current is switched off; (b) see if one carbon cools off quicker than the other after the current is switched off; (c) see if a brown spot appears on the screen, (d) listen if the arc "sings."

*3. In a projection machine running at a speed of 90 feet of film per minute, how many times does the intermittent sprocket operate during this minute:*

(a) 600; (b) 900; (c) 1200. (d) 1440.

*4. If the arc is burning steadily, and the optical system, reflector and focus are all adjusted properly, and yet there appears a hot spot on the screen, with a corresponding lack of illumination at other parts of the screen, what may be the cause:*

(a) the picture is out of frame; (b) the arc is out of alignment: (c) the current is too great, (d) the arc voltage is too high.

*5. If a howl or squeal develops in the sound reproduction the most likely place to find the cause is:*

(a) in the photocell; (b) in the loud speakers; (c) in the exciter lamp. (d) in the amplifier.

*6. Weak reproduction might be caused by:*

(a) the low voltage on the arc, and misalignment; (b) the weakness of the photocell or amplifier tubes; (c) the picture being out of focus, or travel-ghost, (d) the wrong carbons in arc.

*7. In threading film in a sound motion picture projector, the length of film between the picture aperture and the sound aperture is:*

(a) 30 frames; (b) 28 frames; (c) 26 frames, (d) 20 frames.

*8. As the theatre fills up with patrons:*

(a) the sound increases and the fader must be turned down; (b) the sound increases and the fader must be turned up; (c) the sound decreases and the fader must be turned down, (d) the sound decreases and the fader must be turned up.

*9. Permanent motion picture booths in which more than one professional type machine is to be operated must have at least the following dimensions:*

(a) 7 ft. high by 7½ ft. by 10 ft; (b) 7 ft. high by any size you desire; (c) 7 ft. high by 7½ ft. by 10 ft. for the first machine plus 24 additional square feet for each additional machine, (d) any height by any width by any length as long as the projectionist can get about in it.

*10. In order to measure the current taken by a load, the meter should be connected:*

(a) in series with the load; (b) across the load; (c) across the line, (d) in multiple with the load.

*11. When booths are in use, a current of air must be maintained through the booth to the outer air, which shall be sufficient to furnish a complete change of air every:*

(a) 5 minutes; (b) 10 minutes; (c) 15 minutes, (d) 20 minutes.

*12. The minimum cross-sectional area of the vent pipe required to ventilate the booth shall be:*

(a) 58 square inches; (b) 68 square inches; (c) 78 square inches, (d) 88 square inches.

*13. The amount of film which must be threaded in a professional projector between the center of the aperture plate and the sound slit should be for excellent results:*

(a) 15 one-third frames; (b) 17 one-third frames; (c) 19 one-third frames, (d) 21 one-third frames.

*14. When a professional projector is driven by a synchronous motor and runs at a speed so that 90 feet of film pass through the film gate per minute the intermittent sprocket rotates at:*

(a) 60 r. p. m.; (b) 120 r. p. m.; (c) 240 r. p. m., (d) 360 r. p. m.

*15. The allowable current carrying capacity of a #4; B. & S., R.C. wire is:*

(a) 100 amperes; (b) 90 amperes; (c) 80 amperes, (d) 70 amperes.

*16. When the picture suddenly goes out of frame after the projector has been running for a short time, the reason for it is that:*

(a) the machine is running too fast; (b) the machine is running too slow; (c) the film has torn sprocket holes, (d) the film has no upper loop.

*17. When timing a revolving shutter, the*

## WESTREX OVERSEAS BRANCH MANAGERS AT RECENT NEW YORK MEET

Managers of eight Westrex Corp. subsidiaries in South America, Asia, Panama, North Africa, Australia, and the Caribbeon area attended a series of conferences last month at the home office in New York City. Pictured here, left to right, are E. S. Gregg, president of Westrex; Miles Storms, II, Venezuela; William E. Kollmyer, Australia; Jesus Cuevas, Brazil; Jan J. DeBoer, Ponama; Andre C. Leonoel, Algeria; Dennis L. Smith, Colombia, and Harro V. Zeppelin, Philippines. Also attending the conferences but not shown with the group above was Orest J. Forest, monager of the Cuba branch.

Managers from eight of Westrex Corp.'s subsidiaries in South America, Asia, Panama, North Africa, Australia, and the Caribbean area attended a conference in New York City March 18-29. They studied the latest technical equipment developed at Westrex's testing laoratories in New York and Hollywood. Besides individual discussions, the conferees also inspected the facilities of Northern Electric Company's plant in Belleville, Canada, and the motion picture studio equipment and operations at the Canadian National Film Board Studios in Montreal.

## "Oil Leaks?"—Maybe Not, Says An Expert

By LOU WALTERS

*(Lou Walters, full working member of Dallas Local 249, gold card holder in St. Louis Local 143, active projectionist, repair and serviceman, former district manager for National Theatre Supply, RCA, and Ampro, has been in the technical side of the motion picture business for 48 years. He was responsible for the first large screen projection in the Cleveland Stadium—and IP carried that story—in July 1940. Enough said.)*

Since I am in the projector repair business, I get a lot of first-hand complaints, and the one that seems outstanding is "oil leaks" on the projector mechanism. I have had the same movements returned several times with the complaint that it "leaks oil." Upon examination, I found that the movement was filled above the oil site level, and did not leak if properly oiled. To properly oil, one should rotate the movement until the oil site glasses are level, then carefully pump oil from a force feed oilcan into the movement until the oil shows in the center of both glasses.

This is the required amount of oil as determined by the manufacturer. If more oil is put into the movement, it will find its way out either by leaking through the cam bearing or flywheel bearing until it has reached the level intended for the movement to operate satisfactorily.

The above comment covers the standard and Super Simplex projectors. In the case of the Simplex E-7 movement, the manner of oiling is the same, but the chance of apparent leakage is more sudden, because of a series of short tubes inside the movement which acts as a siphon. If one were to pump a gallon of oil into the movement, it would all come out the escape holes, except approximately four ounces that would remain in the movement and would be sufficient for safe operation.

### *Watch the Angle, Level*

Another case of so-called oil leaks happens with the Brenkert and Simplex XL projectors which use the splash system. There are several things to watch and take into consideration to determine proper oiling, prevent so-called leaks, and yet keep the oil level safe for operation. The angle of the projector necessarily changes standard oil level marks on the Brenkert—they were molded into the oil indicator for level operation. Bear in mind this is only an indicator, and the projectionist must determine the oil level of the projector at the degree of angle, either tilted down or reverse, which is the case in many drive-in theatres.

The left-hand door of both projectors is equipped with an oil seal made of neoprene rubber, and care should be taken when these doors are put back on, if they have to be removed for any reason. I find it best to fit the door in its place and then tighten each screw or knurled nut evenly. Do not tighten any one screw or nut as far as it will go, causing a bind on the door and resulting in an oil leak.

Before closing on this subject I would like to remind the E-7 users that a special shutter gear lubricant is available at Simplex dealers. This is a lead base oil, and is used only on the shutter shaft where the horizontal gear slides. This oil prevents a rust condition which very often forms on the shaft inside the horizontal gear.

If you are experiencing difficulty in framing other than one position, and should you introduce lost motion and travel ghost when the framing mechanism is moved, then your gear is rusted to the shutter shaft.

A good suggestion for all is to refer to the instruction books on the equipment you are using. If these books have been lost or misplaced, get in contact with your closest supply dealer for another copy.

Forthcoming subjects will deal with care, adjustment, and operation of generator and rectifier equipment.

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*shutter running adjustment should be placed in:*

(a) the extreme top position; (b) the extreme lower position; (c) the center position, (d) any position at all.

*18. You have a single-phase service in your booth and wish to get DC for your arc. You would use a:*

(a) single-phase rotary converter; (b) DC generator driven by a polyphase motor; (c) single-phase transformer, (d) mercury arc rectifier.

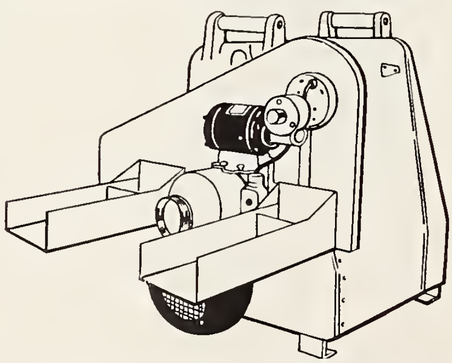
### Answers to Exam Questions

| | | |
|---|---|---|
| 1. B | 7. D | 13. C |
| 2. B | 8. D | 14. D |
| 3. D | 9. C | 15. D |
| 4. B | 10. A | 16. C |
| 5. D | 11. B | 17. C |
| 6. B | 12. C | 18. D |

## Genarco's New Slide Projector

Genarco, Inc., of Jamaica, New York, is now producing a new 3000 watt slide projector with a 70 slide changer, Model SM.2. Light source is a 300 watt tungsten lamp that the firm expects will have a life of 100 hours.

The slides and the entire mechanism are cooled by electric blowers of 280 cubic feet per minute capacity. Slides are also protected by a modern dichroid heat-reflecting filter. As many as 70 slides can be placed in one tray and transferred to another tray by pushbutton remote control. This change takes less than half a second.



The Model SM.2 projector comes with either the standard wide-angle lens suitable for rear projection on a translucent screen, or with all dimensions of lenses for operation from a theatre projection room, or from the rear of an auditorium.

Employing standard 3¼-inch by 4-inch slides, the projector is said to be suitable for large meetings of 75 to several thousand people.

## OBITUARIES

Flask, Sr., Daniel V., 59, member of Pittsburgh Local 171, succumbed to a heart attack March 1. A member of the Local since 1917, he held the office of president at the time of his death. Flask worked as projectionist at the Senator, Stanley, and Loew's Penn Theatres in Pittsburgh. He was a veteran of World War I.

• • •

Altvater, Edward J., 68, and Charles Taylor, 82, veteran members of Cincinnati Local 327, died recently. Edward Altvater was initiated into the Local February 11, 1921 and had worked as projectionist at the Empire Theatre in Cincinnati until he was stricken with a heart and kidney ailment about four months ago. Charles Taylor, a member since July 28, 1925, retired about 10 years ago.

• • •

Sasse, Leo, 55, member of Milwaukee Local 164 since 1927, succumbed to a heart and asthmatic condition from which he suffered for quite some time. At the time of his death he was employed at the Fox Bay Theatre, one of the newer suburban theatres in the Milwaukee area. His wife survives him.

## PERSONAL NOTES

William B. Stapleton, former picture editor of Collier's magazine, has joined the editorial service bureau of Eastman Kodak Company. He will direct the Newspaper National Snapshot Awards and will handle special contacts with magazines. Collier's picture editor from 1949 up to that magazine's recent dissolution, Stapleton is well known for his articles, photographs, and cover photos there. He has also served as foreign correspondent for the late publication, covering the Korean war, Japan, Paris, and South and Central America.

* * *

R. A. Moe is slated as manager of the West Coast facilities, systems engineering operations, government service department of RCA Service Co. Joining RCA in 1951 as a field engineer at the San Diego Naval Base, Moe recently has served as manager of Systems Engineering for the West Coast area. He will be in charge of all government service department activity on the West Coast, including contract proposal preparation, estimates, engineering planning, and administration.

* * *

Clarence M. Leeds has been named, as of March 18 last, vice-president in charge of all manufacturing for the Simplex Equipment Corp. (formerly International Projector Corp.) in Bloomfield, N. J. Mr. Leeds has had an extensive background in the financial management, manufacturing, and labor relations branches of the aircraft and electronic communications industries. An alumnus of Lafayette College and New York University, he joins this important member of the General Precision Corp. on the eve of one of its most vital periods of expansion in the audio-visual field.

Simplex Equipment Corp. enjoys a world-wide reputation of fine professional motion picture projectors and associated audio-visual units, including stereophonic sound reproducing systems for theatres, precision electro-mechanical components, and the widely-publicized GPL self-contained airborne navigation systems.

* * *

C. S. Perkins, now operating manager of Altec Service Co. has been appointed general manager. Marty Wolf, in addition to his present function as sales manager, will become assistant general manager. Both appointments are effective immediately.

Messrs. Perkins and Wolf are veteran members of Altec since 1937, when the

company took over the activities of ERPI in the field of motion picture exhibition, and are nationally known in the field.

In announcing these changes, executive vice-president H. M. Bessey pointed out that Altec's long-time activities in the motion picture industry are being augmented through the design, installation, and maintenance of a large volume of sound systems in the non-theatrical field, including industry, commerce, education, recreation, etc.

* * *

J. HOWARD SCHUMACHER, JR., has been appointed to the post of staff engineer for the Society of Motion Picture and Television Engineers. The appointment becomes effective June 10.

Mr. Schumacher is presently employed as laboratory technician for NBC Development. He has been associated with NBC for 12 years. His education includes extensive courses in engineering and management at RCA Institutes, Hofstra College, and Polytechnic Institute of Brooklyn.

## IA ELECTIONS

**LOCAL 162, SAN FRANCISCO, CALIF.**

Rexford Elder, *pres.;* Carlo J. Colombo, *vice-pres.;* James R. Dixon, Jr., *sec.-treas.;* Paul G. Zern, *bus. rep.;* Neal J. Salemi, *sgt.-at-arms;* C. J. Colombo, William H. Lingle, Harold Diederichsen, Everett W. Holladay, Samuel L. Johnson, *exec. board.*

**LOCAL 277, BRIDGEPORT, CONN.**

John S. Benard, *pres.;* Leslie C. Blakeslee, *vice-pres.;* Merrick Parrell, *fin.-sec.;* Thomas E. Colwell, *rec.-sec.;* Fred Lewis, *treas.;* John A. Martin, *bus. rep.;* John Lynch, *sgt.-at-arms;* L. C. Blakeslee, Joseph Kaplan, Francis J. Gorman, J. Lynch, Joseph C. Cossette, *trustees;* Harold W. Ryckman, F. J. Gorman, J. Kaplan, Roland J. McLeod, *exec. board;* J. A. Martin, *del. to conventions,* and J. S. Benard, *alternate del.*

## PROJECTION CLINIC

(*Continued from page 22*)

suds of a gentle soap . . . followed by a thorough rinse with clean water . . . on a nearly dry cloth. . . .

"No commercial cleaning fluid is recommended by Bausch & Lomb for the cleaning of high-grade lenses because they are all in essence the same solution [of detergent or soap]. There is no point in paying for a product which is 99% water. One can make his own lens-cleaning solution which, while it may not bear a fancy label and a specious guarantee, will be no less effective in removing dirt."

A lens-cleaning kit, serviceable for both coated and uncoated lenses, consists of the following:

A. Round camel's-hair brush of the soft-bristled type used by water-color artists.

B. A plentiful supply of small squares of well-washed, soft cotton cloth. (Lens paper may be substituted.)

C. A supply of toothpicks. (Store in a glass pill bottle.)

D. A 1-ounce bottle of carbon tetrachloride (or "Carbona") for removing accidental oil and paint spots from lenses. Label: "SPOT-REMOVER SOLVENT. *Use with caution!*"

E. A 2-ounce bottle of water, "soft" or distilled, in which a *very small* fragment of "Ivory" soap has been dissolved. Label: "MILD SOAP SOLUTION."

F. A 4-ounce bottle of distilled water. Label: "PURE WATER. *Discard if contaminated.*"

G. A tightly covered dust-free box for storing the above items.

### *Cleaning Procedure*

Old-style objectives may have to be taken apart at long intervals to remove dust and oil stains from the inner surfaces of the lenses. *New-style lenses having hermetically sealed barrels should never be dismantled by the projectionist.* To clean projection lenses:

1. Carefully brush dust from the lens surfaces with the camel's-hair brush. If still soiled, as by fingermarks:

2. Breathe on the lenses and *gently* wipe with a wad of cotton cloth or lens paper, using a circular motion. If oil-smear still remains:

3. Barely moisten a cotton pad with the mild soap solution and rub the lens as lightly as possible. Moisten another pad in pure water and rinse. (Avoid wetting the edges of the glass.) Wipe with a dry pad of cotton, using a circular motion. (This procedure is often necessary when the rear-lens surface directly facing the aperture becomes oil-fogged.)

4. Paint, tar, and spots of heavy grease require *cautious* applications of a Carbona-moistened cloth wrapped around the thick end of a toothpick. (Do not

use a matchstick, which is necessarily waxy.) Follow with the soap solution, as above, then with plain water and wipe dry after breathing on the lens, if necessary.

Remember never to wipe a *dry* lens with a *dry* cloth. Cover the surface of the glass with a film of moisture by breathing on the glass before wiping. Depend on the camel's-hair brush as much as possible, using the more drastic steps only when absolutely required. Conscientious lens care will preserve the lenses almost indefinitely.

## DISTRICT NO. 2

(*Continued from page* 19)

Seattle Local 154, keep sound and 11 projectors interlocked for "Circarama" (360 degrees Cinerama in 16-mm); Rex Kinsey, Vancouver (Wash.) Local 401, and Walt "Babe" Coleman, assistant chief at Disneyland and secretary of the Santa Ana Local, blast you off for the "Trip to the Moon," and Brother Jim Harman of Local 707, Hemet, Calif., holds the fort in the Richfield projection room.

A single Peerless Magnarc lamp and Simplex X-L head with Super Panatar lens mounted on a Simplex base is used in the Richfield show, "The World Beneath Us," for projection of a CinemaScope cartooned short. Throw is approximately 30 feet for a 26-foot picture. Two 16-mm Eastmans, located below the stage floor, are also used in conjunction with the 35-mm for this show. The entire system is automatically controlled—Jim strikes his arc, starts the control system, and then stands by while the busy little electrons take over the complete show.

We were crowding show time for Ralph, so we hustled over to Pepsi-Cola's "Golden Horseshoe" where all the galoots had gathered to see the very lovely Slu Foot Sue knock 'em dead, with co-star Donald Novis, plus an excellent cast of dancers and comics. You young old-timers will recall Novis, the silver-voiced tenor, for his popular coast-to-coast radio program of some years back. When not in character the lovely Sue is known as Betty Taylor and is the niece of our highly esteemed IA 2nd vice-president, Carl Cooper. From his back stage control panel, Ralph handles all the lights (spot and effects), backgrounds, and curtains for this show. This one is a "must see" when you visit Disneyland.

Luncheon was a junior sized District 2 Council meeting since we were joined by Art Narath, president, and "Babe" Coleman, secretary, Local 504; Stanley Wedell, business representative, and Jack Ward, secretary, Long Beach Local 521; and Frank Smith, president of Hemet Local 707. Main topic of discussion was the successful negotiations by Wallace Crowley and George Schaffer, president and business representative, respectively, of Los Angeles Local 150. More about that later.

We continued with our tour after lunch and I got a close look at the operation of the electronic gear in the park. Everything that moves has a p. a. system with speakers in every car in the multiple units. The various jungle inhabitants (man and beast) are electronically controlled, given voice by the Mackensie repeaters running continuous tape, and triggered to action by river boats equipped with photocell control mechanisms and located at key positions along the route of travel.

### *Maintenance of Equipment*

Servicing and maintenance of electronic and projection equipment is supervised by Brother Dean Narath assisted by Art Narath (his Pop). Gerald Bates, George Short, and John Gerlach handle the operation, repair, and installation of sound and electronic equipment; Dominic Conte specializes in the repair of the projectors. All of these gents are members of Santa Ana Local 504. The permanent maintenance crew consists of 20 IA men, with another 6 IA men added during the summer season.

"Babe" Coleman and "Robbie" Robinson (the latter is a member of Long Beach Local 521), operate the projection room in the attractive 450-seat Mickey Mouse Theatre in Fantasyland. This projection room, Simplex X-L and Peerless Magnarc equipped, is the only complete 35-mm installation in the park (plus one 35-mm unit in the Richfield show). The presentation here features a half hour 3-D show consisting of cartoons and the very popular Jimmy Dodd and Mouseketeers of TV fame.

At this point, time demanded we call "finis" to this wonderful tour. My sincere thanks to Brother Ralph Adams, my most genial and gracious host, his very swell

crew, and Uncle Walt Disney and his staff for making it possible for me to visit the "inner workings" of Disneyland.

### *Local 150 Contracts*

Meanwhile back at the ranch (not Frontierland but Local 150), the negotiating committee consisting of W. G. Crowley, George Schaffer, Charles Y. Crowe, Paul Mahoney, Earl Hamilton, L. W. Neville, and E. L. "Blondie" Robbins successfully concluded negotiations for new contracts with exhibitors in the Los Angeles area. A special midnight meeting was called and the membership voted acceptance of the contracts which are retroactive to the expiration date of the previous pacts and will run until June 30, 1962.

Among the benefits included in the new agreements is a 10 cents per hour increase retroactive to the expiration date of the expired contracts (Feb. 1, 1956 for the independents, July 1, 1956 for the major theatres, and Oct. 1, 1956 for drive-ins), until June 30, 1958. On July 1, 1958 an additional 10 cents per hour wage increase will become effective and continue until January 2, 1960.

Ninety days prior to this date and upon notice by the Local the contracts may be reopened for the purpose of negotiating increases in wages and employers' Welfare Fund contributions only. This privilege is the Local's option and not that of the employers. The employers will contribute to Local 150's Welfare Fund an amount equal to 6 cents per hour for each regular straight-time contracted hour commencing July 1, 1958.

Minimum call periods have been increased from 2 to 4 hours, and the continuous run houses (both first-run and subsequent-run) having two 6-hour shifts cannot reduce shift time for the duration of this new contract. An important feature of the new pact is the retention of the two-man projection shifts, which is guaranteed for five years.

### *Film Cooling a la Nature*

I received a letter recently from Gene Daltorio, co-owner of the Gala Drive-In Theatre in Akron, Ohio, in reply to my recommendation of Harry Cole's (Local 150) projection mechanism and film cooler (Cinemair). Gene advised me that the Gala Drive-In opened on March 28 last with no heat problems. As a matter of fact, there was such an abundance of snow and rain and cold weather that cooling was accomplished simply by opening the door of the projection room. Back in 1942, Gene, Joe Constantino (Paterson, N. J.), and I worked the projection room at General Depot G-25 in Ashchurch, England. When we Southern California projectionists read of such reports we don't mind our nice warm smog so much.

## DRIVE-IN PROJECTION

(*Continued from page 12*)

out film and with the gate door open.

5. Fill the intermittent oilwell with the type of fresh oil recommended by the manufacturer of the machine. Then lubricate the remainder of the projector, including soundhead, motor, and drive-gear bearings. Remember the minor parts which require the application of a small droplet of oil once in a great while.

6. Check condition of the upper magazine. Replace worn or damaged jacks and reel keys. Establish proper holdback tension, tightening the locknut securely. Oil the spindle-shaft bearing. Make certain that the fire-valve rollers are clean and revolve properly so as not to scratch film.

7. Check tension of takeup and replace lower-magazine reel key, if necessary. There should be sufficient take-up tension to turn a fully loaded 2,000-foot reel, yet not enough to prevent the revolving reel from being held back by the touch of a finger. Clean dirty clutch friction disks and oil the spindle-shaft bearings. Replace worn take-up belt to insure smooth takeup action. Check the condition of the lower fire-valve rollers.

8. Check sprockets, lateral positioning of pad rollers, and check for proper film clearance. (Two thicknesses of

safety film threaded over a sprocket should be only *very slightly* loose when the pad roller is closed.)

9. Examine the film gate for worn runners and pressure pads. Adjust pads for average tension, equal on both sides, and with the set of pads at the aperture having the greatest tension. Check the flanged lateral guide rollers for cleanliness and free turning. Replace bent or scored flanges. (Do not attempt lateral adjustment of the guide rollers unless projection tests reveal incorrect positioning.)

10. Observe the action of the automatic fire shutter and readjust this component if it does not lift and drop properly when the motor is switched on and off. (*Warning!* Never switch a projector motor on before the machine has come to rest. If the momentum of the projection machine is added to the starting torque of the motor, gears may be stripped.)

11. Correct any defects of the soundheads and sharpen the scanning-beam focus in optical soundheads according to instructions or by the "flicker test" given in "R. A. Mitchell's Manual of Practical Projection."

### *Arc Lamp Adjustment*

12. Thread up a reel of film in each projector and run, but do not project upon the screen until the arc lamps have been properly adjusted. Observe the action of the film loops, the intermittent sprocket, and the takeup. Play sound to check volume balance between the two projectors as well as reproduction quality.

13. Examine the rectifiers or motor-generator set. Blow dust from the generator, clean the commutator, and "dress" it with the merest trace of vaseline to establish the desired chocolate-brown oxide coating. Replace all worn brushes, seating new brushes properly, and check brush tension. Lubricate the generator set.

14. Remove the mirrors or condensers from the arc lamps, clean the lamphouses thoroughly, and supply lubrication where required. Replace worn or burned V-guides in simplified HI lamps, positive burners in rotating-positive HI lamps, and tighten all electrical connections.

Be sure that the ventilating system works properly, then burn a trim of carbons and adjust feeding rate to establish a steady arc that maintains an unvarying crater position. (Mirror lamps not having a separately adjusted negative feed are not recommended.)

15. Replace the *cleaned* lenses in the projectors and clean the port glasses.

16. Line up the arc lamps with the projector heads, if this has not already been done. Replace mirrors and condensing lenses, insert heat filters, switch the projector motors on, and project blank light to the screen. (If dampness in the air causes the projection lenses to fog, cut off the light to avoid breakage.) Adjust mirrors for maximum, evenly distributed light without color or light changes when changeovers are made. The "aim" of the projectors may now be touched up so that the two projected fields of light superimpose on the screen.

Side-to-center distribution of screen illumination should not be less than 80% in indoor theatres. Lamps unable to meet this minimum standard of light quality may require elliptical mirrors which the manufacturer is unable to supply. A different make of lamp should eventually be purchased, and then only after a trial period.

17. Time the projector shutters, first making sure that the shutter blades are of equal width to prevent 24-cycle flicker. (Turn the projector by hand, and when 2 teeth of the inter-

mittent sprocket have passed a fixed reference point, the shutter, freed on its shaft, should be turned until a shutter blade is in mid-cutoff position. Tighten the shutter set screws.)

18. Run a reel of film in each projector to establish picture focus and to check for image quality. Correct any defects which may be noticed. If a slight amount of travel ghost is visible, remove with the shutter timing knob while a picture, preferably containing dark-background titles, is being projected.

The substitution of a "fast" (*f*:1.8 or *f*:1.7) mirror lamp for an older model requires wider shutter blades to avoid travel ghost. In many instances it has been found that the lower degree of shutter transmission almost exactly counteracts the extra light produced by the faster lamp. Result: higher carbon and current bills, but no more light on the screen. Lamps faster than *f*:2.0 should therefore be reserved for drive-in theatres, where picture quality is not as important as it is in indoor theatres.

The projection installation is then ready for presenting the first show of the season with possibility of breakdown reduced to the absolute minimum and with a high quality of picture and sound presentation assured.

### Operating Hints

A high quality of uninterrupted projection can be maintained in drive-ins and other summer theatres through the entire operating season by daily attention to cleanliness, mechanism adjustment, and the use of proper carbons.

If the lamps are correctly aligned at the first of the season, chances are that they will remain so. It is nevertheless necessary to check lamp adjustment each time the projector heads are removed and replaced.

There are several excellent brands of projector carbons available (National, Lorraine, Ship, and Diamond, among others); but unless the proper trim is used for the current burned, screen light will be unsatisfactory. *Burn carbons at their maximum rated amperage for maximum light output per ampere.* The use of larger carbons will decrease both light and carbon consumption: *never* burn carbons at currents greater than the rated maximum!

Image definition of the projected picture is ruined by projector-port



glasses which are not of the highest quality. Optical glass is expensive, but no other kind should be used.

If adequate picture brightness is a serious problem, narrow the shutter blades down until travel ghost just begins to appear on both the tops and bottoms of bright areas in the projected picture—then widen the blades a trifle. *Never, under any conditions, narrow one blade more than the other!* A self-styled expert in drive-in projection recently publicized the light-saving method of "one inch cut off each side of the 'flicker blade' (*sic*), or a total of two inches." Light may indeed be increased, but unavoidably by generating a 24-cycle flicker strong enough to give your eyeballs rheumatism! Our advice: *don't try it!*

Occasionally check the screen surface against a fresh sample to assure yourself that the screen is not wasting too much of the light.

Keep your lenses clean, but avoid *overcleaning* them. Remove dust deposits from lamp mirrors and heat filters before each performance. Any soot deposits found on arc mirrors should be removed immediately to prevent breakage of the glass.

### Cleaning Hints

Wipe dirt from the film gate every day and use an orange-wood stick or piece of heavy copper wire chisel-shaped at the end to remove hard emulsion deposits from the film runners. A small, lint-free rag is suitable for wiping dirt from the flanged guide roller.

Remove film chips from the fire-valve rollers and polish them every day. A length of film cut lengthwise along the sprocket holes to provide a saw-tooth edge is effective for removing dirt which has accumulated in the fire valves.

A small paint brush and a liberal supply of cotton rags are indispensable for the daily cleaning routine. As for sprocket teeth, nothing works better than a stiff-bristled toothbrush dipped in kerosene.

Oil the projectors sparingly, but regularly. An ejector oilcan is suitable for filling the intermittent well; a medicine dropper is best for most of the bearing oil holes; while a toothpick can't be beat for applying small drops of oil to idler and pad-roller oil holes.

## Your Preference?

**What would you like most to see covered in future issues of IP? We aim to please, and what YOU want to appear in the pages of this magazine is the most important thing to us. So, if there's a particular subject (or subjects—any number) on your mind, just fill in the lines below and return to us. We'll do the rest.**

INTERNATIONAL PROJECTIONIST, 19 West 44 St., New York 36, N. Y.

Gentlemen: I would like to see published in IP articles (and drawings) relating to the following subjects:

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NAME .............................................. ADDRESS ..............................................


### *Her home was in a part of the city where anything could happen*

WAKING ONE MIDNIGHT, she surprised a burglar in her room. As he leapt for the window, she stopped him. "You'll be hurt. Go down by the stairs and let yourself out."

Calm, kind, and acutely intelligent, she had long ago learned to stay human in emergencies—by living where emergencies were routine, in the heart of one of Chicago's poorest immigrant neighborhoods.

Here she had settled down to her life work—helping people. No sociologist or social worker, she left it for others to make this a science. To her, it was an art. An art she practiced so beautifully that, eventually, while she was loved around Halsted Street, she was admired around the world.

When, in 1935, Jane Addams of Hull House died, her little grandniece, seeing hundreds of children among the mourners, asked, "Are we all Aunt Jane's children?"

In a sense, we all are. For the work Jane Addams did and the lessons she taught still help us all. And they prove magnificently the fact that America's greatest wealth lies in Americans.

It is the character and abilities of her people that make this country strong. And it is these selfsame people who make our nation's Savings Bonds one of the world's finest investments. For in U. S. Savings Bonds your principal is guaranteed safe to any amount—and your interest guaranteed sure—by the government that represents the united strength of 168 million Americans. So for your family's security, buy Savings Bonds. Buy them at your bank or through the Payroll Savings Plan at work. And hold on to them.

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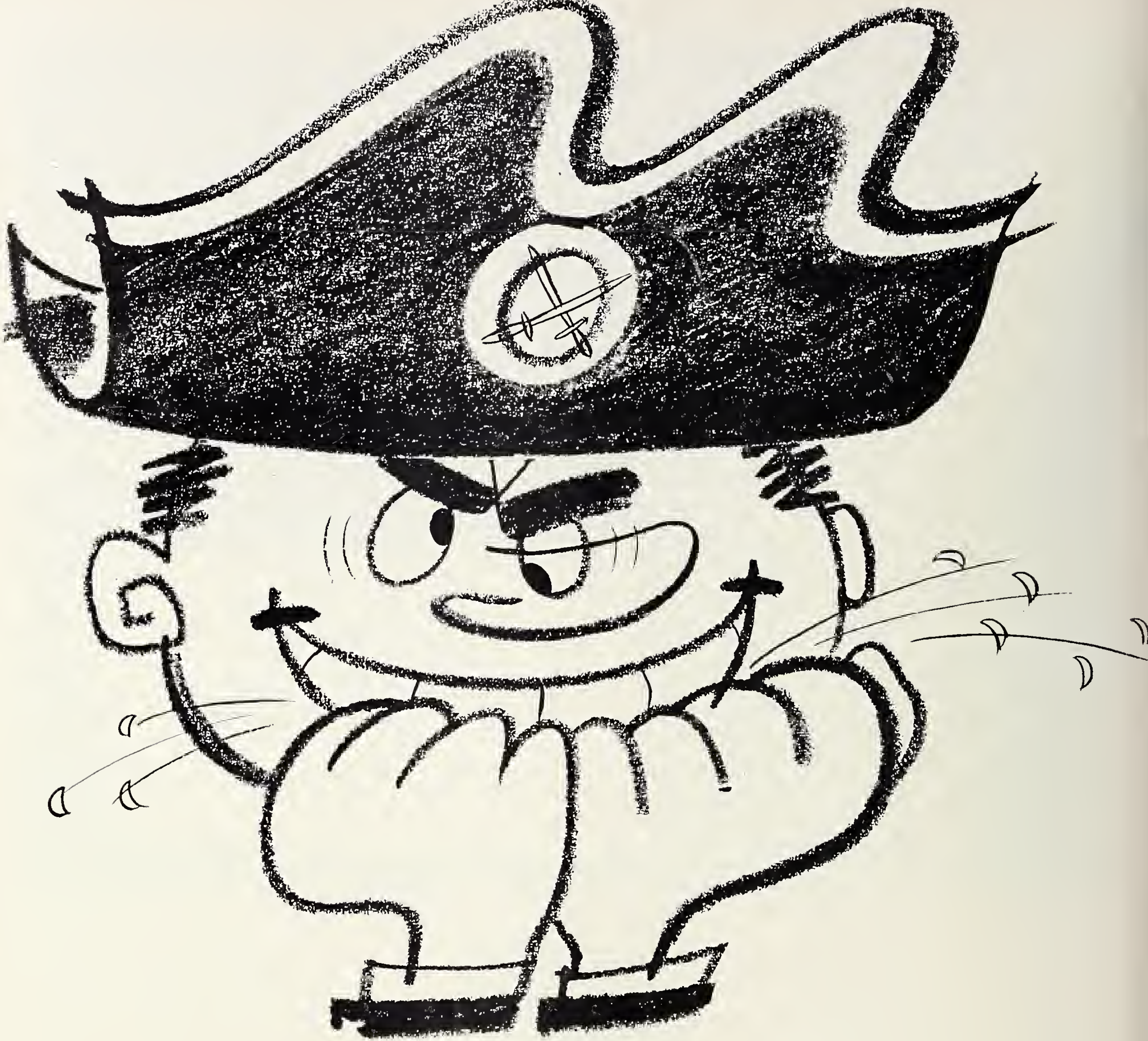

# INTERNATIONAL PROJECTIONIST





JUNE 1957

VOLUME 32 • NUMBER 6

30c A COPY • $2.50 A YEAR

# *No lamp in the World!*

## CAN PRODUCE SO MUCH LIGHT.

Hy-Candescents were selected for all **important** "CINERAMA" installations. (Chicago, New York, Los Angeles, San Francisco, Philadelphia, and Washington, D. C.)

Hy-Candescents were chosen by Paramount for **all** installations of Horizontal "VISTA-VISION".

Hy-Candescents were again selected by TODD-AO for "OKLAHOMA".

You have to do the same if you want all the light there is for big pictures.

*Peerless*
HY-CANDESCENT
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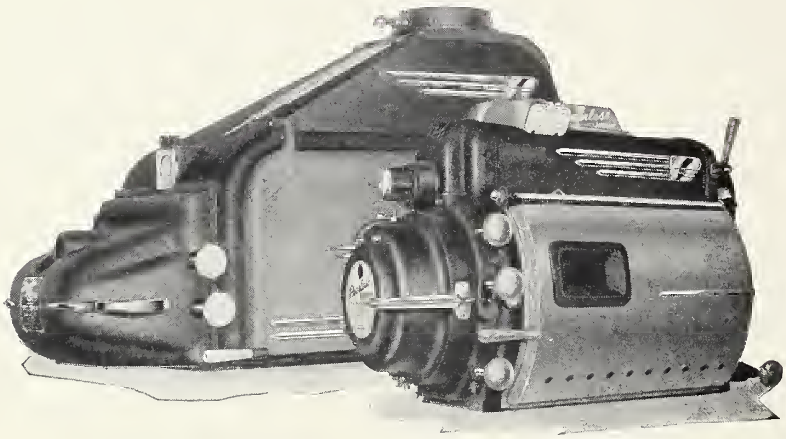

*Peerless*
MAGNARC
TRADE MARK REG
CINEARC

This lamp at 75-80 amperes produces as much and more light as any so called large reflector lamps, using 85-95 amperes, employing expensive heat filters and water cooling systems.

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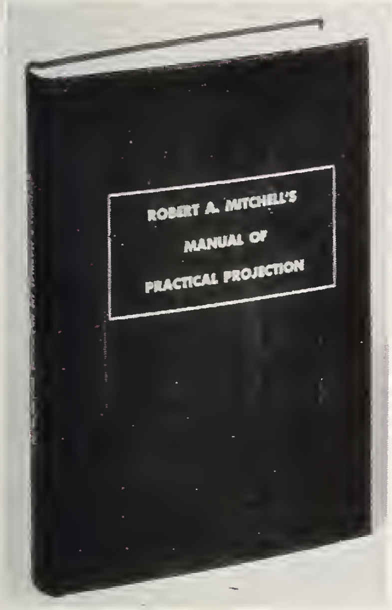


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# International PROJECTIONIST

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R. A. MITCHELL, *Contributing Editor*

**Volume 32 JUNE 1957 Number 6**

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## *Monthly Chat*

### Pay TV Inevitable, Says Par's President

THAT THE AMERICAN public's "motion picture dollar," now cut two ways between theatre entertainment and sponsored TV, will soon be cut three ways is clearly indicated in a statement issued this month (June) by Paramount's president, Barney Balaban. The new, three-way, cut will be into (a) theatre entertainment, (b) sponsored TV and (c) "home boxoffice" pay TV.

However, this does NOT mean that the theatre will get still less patronage than at present, but clearly indicates that theatre grosses are in for an increase.

"The developing pattern of television economics now confirms the view that pay TV is inevitable," the statement reveals. ". . . production costs have risen 'astronomically' in TV, set saturation is being approached, and the problem of reconciling TV ratings with higher costs to the sponsor is becoming more discouraging to advertisers. Pay TV is the answer," Mr. Balaban indicated.

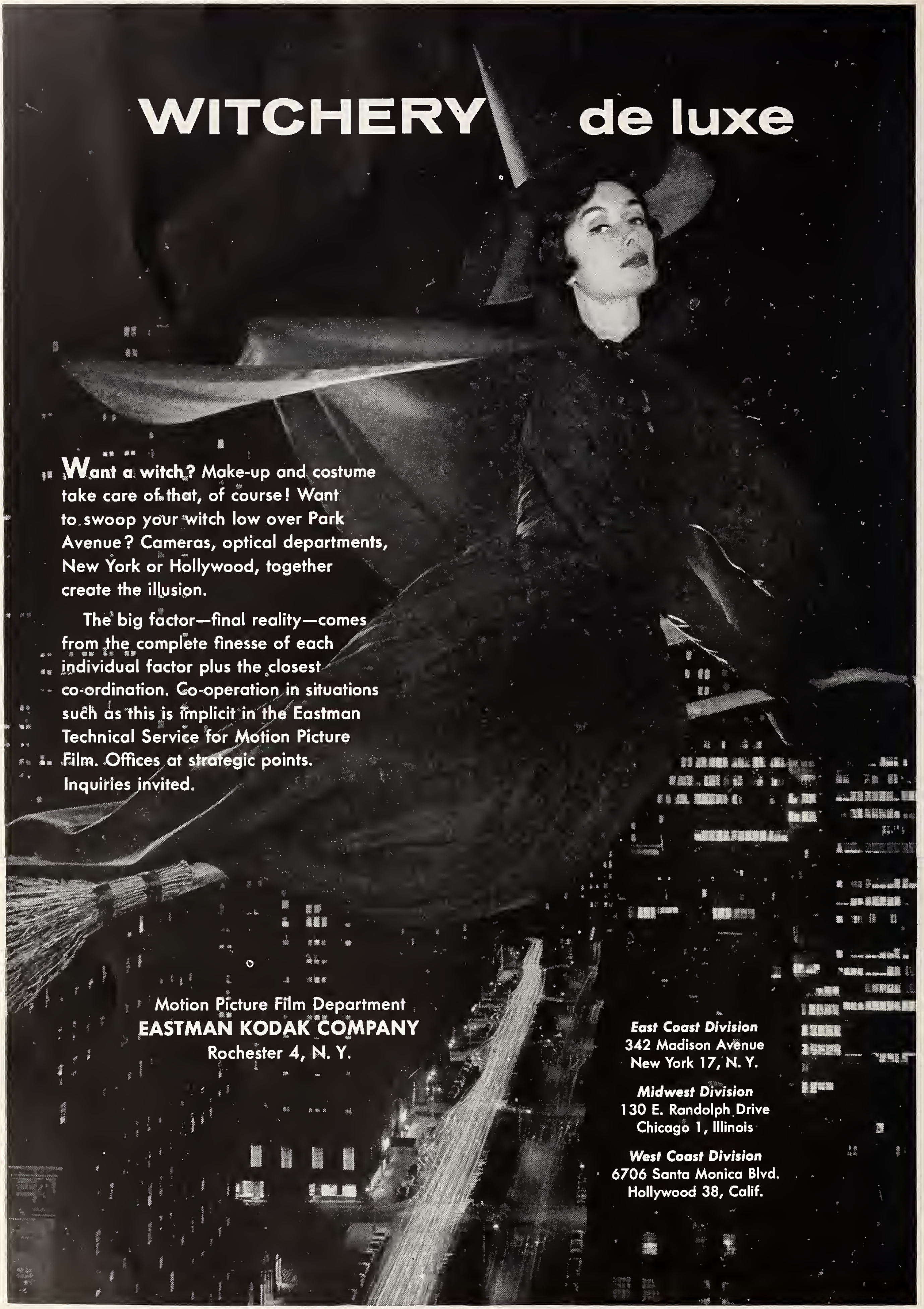
To the extent that advertisers withdraw from TV presentations as being too expensive, paid TV entertainment will fill the gap. To see the more desirable (and therefore more expensive) productions it will become increasingly necessary to pay the home "box office." *How much* the home viewer will have to pay is the next question. Possibly a higher admission rate than at the theatre.

What theatre people can do about this is very plain—cash in on it by making the theatre *more* attractive, *more* comfortable, and the screen and sound presentation more nearly perfect than ever before. As the turn of the economic wheel again sends more instead of fewer patrons into the theatre, surely it will be the duty and the pleasure of all concerned to make the theatre so desirable a place to attend that customers will do some serious reflecting on the differences of picture and sound quality (not to mention dramatic standards) between the motion picture and the canned claptrap currently representing TV.

Projectionists will do their part. The keen interest shown by IP's readers in every tiny detail that will help them deliver even slightly better presentations is proof enough of that. But perhaps, in some situations, the projectionist could do even more. The theatre is his livelihood too; and when he has done his own job superbly well perhaps it would not be entirely impermissible to drop a courteous hint about those chairs with the springs sticking up through the upholstery, or that shabby carpet.

### Take to the Hills, Seriously

AMERICANS HAVE ALWAYS been on the move, and the not-so-current trend to the suburbs is merely a Cadillac outgrowth of the covered wagon. Drive-in operators have recognized that this is a nation on wheels. Recently, it has been encouraging to see that four-wall owners have also recognized that we are suburbanites. Thus, a pattern of building the big houses in the outlying communities is forming. That is where they should be; that is where they shall be in the future; that is where they should have been a good while back.



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INTERNATIONAL PROJECTIONIST

Volume 32 JUNE 1957 Number 6

# Film Standards for Picture and Sound

By ROBERT A. MITCHELL

**In this admittedly controversial article, Mr. Mitchell reiterates his views concerning the relative merits of optical and magnetic sound, with an excursion into magop.**

DESPITE the appearance of several new film sizes designed primarily for wide and curved screens of the "audience-enveloping" variety, the gradual return to standard non-anamorphic release prints with high-grade optical sound, often subsonically cued for stereophonic reproduction, would appear to indicate that the battle of film standards is subsiding. Such, however, is not the case.

The latest manifestation of Hollywood is the magoptical release print.

Now, this attempt upon the exhibition industry constitutes a vigorous reaction on the part of magnetic-sound adherents to the resurgence of regular optical tracks for theatre sound reproduction. But when all aspects of the problem are examined, it can be seen that the magoptical print constitutes an invasion of the undersized sprocket hole introduced by 20th Century-Fox in 1953.

Ironically, magnetic-sound houses have often been forced to resort to the optical track of the combination print because of poor magnetic quality caused by inferior magnetic tracks and worn, broken-down penthouse reproducers.

The matter of sound furnishes an excellent starting point for a review of all film standards affecting the rank and file of motion-picture theatres. And closely allied to the topic of soundtracks standards is the coexistence of two different standards for perforating release positives.

If it had not been for the selection of magnetic tracks for CinemaScope stereophonic sound, film perforations would have remained standard for *all* 35-mm prints. In 1953, however, the Perspecta optical-track stereophonic method had not been fully developed; and the choice of multiple magnetic tracks for CinemaScope release prints was a logical, if not a technologically prudent, one.

### *Shark-Toothed Sprockets*

Use of undersized sprocket holes is questionable from a purely mechanical point of view, particularly as long as "straight optical" prints with standard perforations continue to be used. While the life of "Foxhole" CinemaScope prints is only slightly shorter than that of standard prints, the effect of narrow sprocket teeth upon the larger standard perforations of conventional prints is a growing evil. The smaller teeth tend to notch standard perforations on their sensitive pull-down edges instead of at their corners. The result is a small, but measurable, increase in picture unsteadiness.

Narrow-tooth intermittent sprockets are especially dangerous to prints. Feed and holdback sprockets having small teeth increase perforation damage in the first and last hundred feet or so of every reel. Increase in leader damage is reaching alarming proportions; and even the most careful projectionist can only mitigate, not prevent, it.

Many exhibitors, following releases about "The True Story of Jesse James" being released only in magoptical form, have put in calls to service engineers to install the narrow-tooth sprockets on the double-quick. This product has been making the rounds in standard, as well as magnetic, form.

Other exhibitors, soured by the ultimatum to buy sprockets for no reason other than to obtain lower sound quality, have made the replacement piecemeal. And the thought of being cut off from the CinemaScope output is no more pleasant than the alternative pros-

> **EXCEPTIONS INVITED**
>
> **The reader is warned, usually, by the time-honored(?) phrase: "The writer's opinions do not necessarily reflect those of this magazine." Certainly there is as much diversity of opinion in the magnetic vs. optical dispute as the problems it has occasioned. Considering that, readers' comments on Mr. Mitchell's contentions are encouraged.**

pect of having to play the anamorphic lensings second-run after the prints have been worn out by the magnetic houses. It is hardly conceivable that distributors will rent magoptical prints to optical houses first, even though a tremendous number of first-run theatres are included in this category. So, you see, economic problems affecting the welfare of the entire exhibition industry are created by the magoptical print along with the technical problems more in evidence to projectionists.

Projectionists operating in magnetic-sound theatres are required by the magoptical print to reduce the full CinemaScope aspect ratio of 2.55/1 down to 2.35/1, popularly called the "optical-track ratio." On the other hand, the magoptical print brings to optical-sound projectionists an optical track which is slightly less than half as wide as the standard soundtrack. The volume control must go up to obtain the same loudness of sound: system and surface noises are correspondingly increased; and sound quality deteriorates at a time when the public, hi-fi conscious, wants better, not worse, sound.

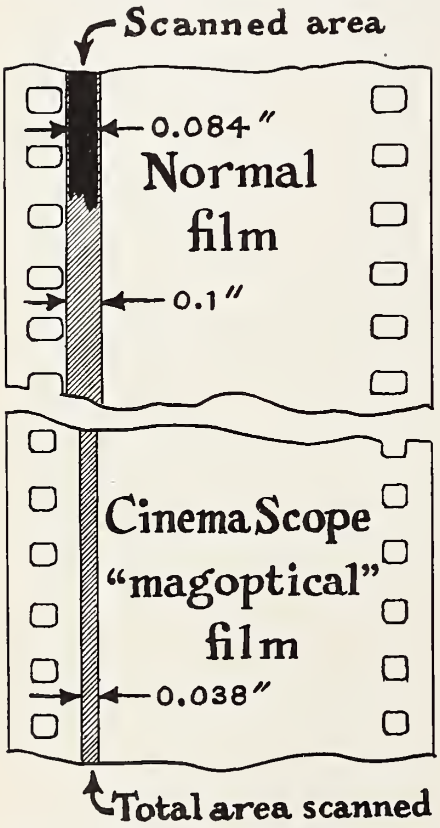



FIG. 1. A comparison of perforation size and optical-sound-track width on normal and "magoptical" print. Magoptical prints, favored by producer-distributor interests to eliminate the need for separate magnetic- and optical-track prints of CinemaScope pictures, are disapproved by a number of projectionists, sound technicians, and exhibitors.

Standard optictal soundtracks (Fig. 1) are 0.1 inch wide, the effective scanned width being 0.084 inch. The optical tracks on magoptical prints are only 0.038 inch wide, the entire area being scanned. Magoptical tracks, accordingly, have only 0.038/0.084, or about 45%, the effective width of normal tracks. There are no high-frequency losses in magoptical tracks, nor is there any increase in distortion. The loss occasioned by them is simply a loss of dynamic range—the range between surface noise and the loudest recordible sound.

### *Variable-Density Tracks*

The optical component of magoptical soundtracks is of the variable-density type on MGM and Fox issues. Even though variable-area optical tracks have long been recognized as more versatile and superior to variable-density in both quality and dynamic range, variable-area tracks definitely lose quality when reduced in width, while variable-density tracks do not. In fact, experimental variable-density tracks only 0.002 inch wide give acceptable results under carefully supervised conditions.

The success of variable-area tracks depends upon the sharpness of the "sawtooth" images. If the *bilateral multifold* system is used, and the scanning beam in the projector soundhead is evenly illuminated across its length, minute errors in optical-tube azimuth do not produce distortion. Azimuthal errors result only in a high-frequency loss, which also occurs with variable-density tracks.

Variable-area tracks have a dynamic range from 10% to 20% greater than that of variable-density tracks, and are more readily "noise-proofed" by a biasing valve. Moreover, they are not subject to photographic emulsion or processing distortions as are variable-density tracks for which contrast control is always critical, no matter which specific variable-density recording process is used. (There are several.)

Also, high-frequency distortion is serious at high modulation levels in the Western Electric ribbon-valve method of variable-density recording. The distortion is caused by the relative motions of the ribbon-valve and the film. This method depends upon the image of a *constantly illuminated* slit which varies in *thickness;* and the resulting distortion is very similar to *severe* azimuthal error in the reproduction of old-style, single-edge variable-area tracks!

The modulated-beam method of variable-density recording is free from this serious defect of the Western Electric system. However, both are subject to minor photographic distortions and low volume when the highest sound quality possible is desired.

The original Fox Movietone aeolight system is plagued by a spurious signal lag analogous to magnetic hysteresis; and because this and the original Western Electric ribbon-valve processes were the only variable-density recording systems in use in the United States in the earliest days of "talking pictures," it is no wonder that Germany was first in the field with superb modulated-beam variable-density tracks. The writer vividly recalls the excellence of these early German sound films exhibited in Mexico at the time when American exhibitors were still struggling with worn, cracked, and out-of-sync Vitaphone records.

When variable-density recording is

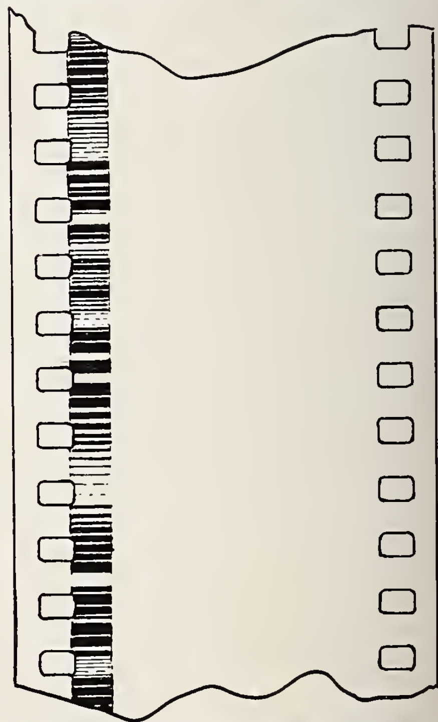


FIG. 2. A variable-density optical-track negative. Good results are obtainable from variable-density tracks when recorded by the modulated-beam method, but the Western Electric ribbon-valve method causes harmonic distortion which becomes appreciable at the higher frequencies, and the Movietone aeolight method suffers from a light lag, analogous to magnetic hysteresis, which also introduces distortion at the higher frequencies. Variable-area optical recording, on the other hand, is free from these defects as well as from the minor photographic distortions which afflict variable-density tracks.

used in the half-width magoptical tracks, the dynamic range (power output between surface-noise level and overmodulation) is reduced by about 10% to begin with; and the reduction of track-width occasions an additional loss of 55%. Up and up must go the volume potentiometer, and with it the system noise, the noise of scratches, splices, etc.

There is no need to linger with the characteristics of CinemaScope magnetic tracks, as worn prints and reproducing equipment have too often been responsible for bad sound. Optical reproduction is the only system that tolerates film wear and neglect of the equipment. We certainly do not advocate neglecting any component of the sound projection equipment; but the projectionist feels better when he is sure that the sound issuing from the stage speakers is always passably good no matter how bad the prints, or how long since the soundheads were overhauled.

### *Deterioration Factor*

Unlike magnetic sound, optical sound is not dependent upon actual physical contact of the "record" with the "reproducer." Disk reproduction is, and so is magnetic reproduction. *If the film doesn't actually rub upon the pole pieces of the magnet clusters in magnetic reproduction, frequency response and quality deteriorate alarmingly.*

Even if the magoptical type of print does nothing else, it permits a direct comparison of magnetic and optical sound. A switchover from one medium to the other will instantly reveal the greater clarity of optical sound in all theatres except those playing *new* prints on *new* magnetic reproducers. In those theatres no difference will be noted aside from the stereophonic effect perceptible to observers "down front"—the very seats which the wall-to-wall CinemaScope screen has emptied of cash customers.

It is the opinion of most sound experts that 35-mm optical recording practice has yet to utilize the full capabilities of the photographic emulsion. The use of highly refined methods in TV 16-mm optical recording has made it fairly easy to obtain the standards of performance customary with commercial (that is, Hollywood) 35-mm recording. In support of this contention, John A. Maurer states in the February 1957 issue of the *Journal of the SMPTE* (p. 50) that if these 16-mm methods were applied to 35-mm film, they would produce records "flat" in response up to *at least* 20,000 cycles, with a signal-to-noise ratio of *at least* 60 db.

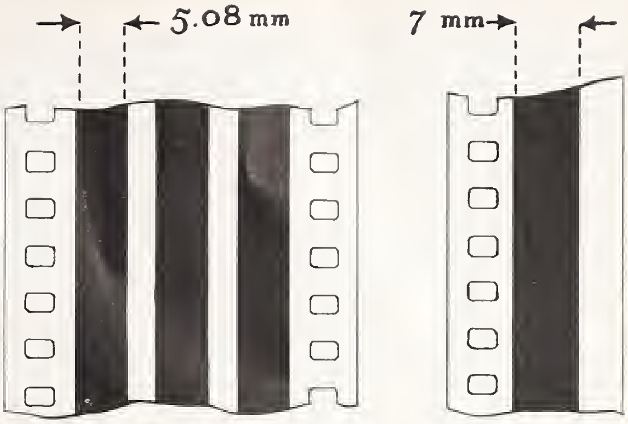



FIG. 3. Magnetic-coated film used for sound recording in most motion-picture studios. The 35-mm film usually carries three magnetic stripes, each about 5-mm in width. The 17½-mm "split film" has a 7-mm striping. The sound recorded in these stripes is later re-recorded optically for the release-print optical tracks.

Mr. Maurer also declares that quality in 16-mm kinescope soundtracks is limited as much by the magnetic master records as by the photographic re-recording process. "It was proved repeatedly that if the photographic release print and the magnetic record from which it was recorded were run simultaneously in synchronism on the best available reproducers, it was impossible to distinguish between them when switching back and forth."

### *10,000 Cycles*

Modern 35-mm recording from push-pull optical or magnetic masters can easily attain an output level to 10,000 cycles *with present-day optical recording-and reproducing-slit dimensions.* In present-day practice, however, output is level to about 8,000 cycles with both variable-density and variable-area tracks, falling off rather sharply to 0 output above this region in the interests of noise reduction and "pleasing" sound reproduction. (Frequency-response adjustments are made in the amplifiers, not the soundheads, to conform to the acoustics of the individual auditorium. These adjustments are the same for CinemaScope magnetic sound and standard optical sound; and audible reproduction of a 10,000-cycle signal occurs principally in theatres having the most antiquated optical-sound systems!)

We have stated time and again that there is no need for reproduction beyond the 8,000-10,000 cycle band in theatre sound, and that to go one octave higher to the highest pitch audible to the average adult listener is quite unnecessary and involves technical disadvantages. Even a 9,000-cycle tone is an indeterminately high-pitched hiss; and this frequency is well reproduced by optical sound and by CinemaScope magnetic sound when the tracks are undamaged and the reproducers unworn.

The dynamic range of optical soundtracks is tremendously in excess of that reproducible on even the most carefully made "hi-fi" disk records. When commercial disk records are made from magnetic-tape originals, the dynamic range is purposely reduced from about 50 db on the original to not more than 30 db on the wide-range disk record offered for sale in music shops. Even with a dynamic range of 40 db on the record, the *pianissimo* passages of the music would become so soft as to be completely dominated by all kinds of interfering sounds such as are normally present in a house: street noises, sounds from neighboring apartments, and even the faint hum of the phonograph amplifier and motor.

### *Listener's Dilemma*

The *Philips Technical Review* (October 1955, p. 103) reports: "Were the dynamic range of a gramophone record any greater, the listener would tend to increase the volume of reproduction somewhat during soft passages, with the result that the sound would be much too strong and, moreover, distorted during the loud passages. The listener would then reduce the volume. This undesirable situation can be avoided by doing what the listener would otherwise have to do, during the actual recording, but in an expert manner with due consideration for the music. Only when the dynamic range of the reproduction has thus been reduced can it afford the listener undisturbed enjoyment."

These remarks apply in lesser degree

(*Continued on page* 28)

**No matter what aspect ratio, print, or what-have-you the projectionist is apt to get, he can expect this.**

# Film Damage: Its Causes and Preventive Measures

By JOSEPH HOLT

Member, IA Local 428, Stockton, Calif.

A READER writes to inquire about "film damage, its causes and preventive measures." Since the questioner indicates by his address that he is a projectionist in military service, the writer's sympathy is at once extended to him. Inasmuch as the points related to film damage apply with equal force to the service or commercial theatre, there is no reason why all readers may not obtain benefit from a review of the most common causes of film damage.

Today the commercial theatre is using hotter light sources, and it is likely that the damage caused by excessive aperture heat will head the list. The remedy has been discussed in numerous articles in IP, and it appears that we may be forced to revise some of our ideas about the point at which damage begins to occur.

### *Recent Remedies*

For some time remedies have been confined to water and/or air cooling of the film itself, the tracks, shoes, and aperture assembly. Recent work indicates that certain heat filters and infra-red transmitting reflectors will put an end to damage from this one important source, without light loss. Since the reader who asks about film damage is in a service theatre, he will not ordinarily encounter a heat problem, but he is almost sure to encounter severe problems in film scratching, edge damage, "rain," and print sticking.

Film scratches arise, as all who have spent any time at all in projection work know, from a multitude of causes. In this day and time when apertures are more often than not filed to fit each picture size, aperture edges may often be rough and film scratching does result. Film magazine rollers must be replaced before the shoulders which ride film edges wear sufficiently to allow the picture and sound portions to bear against the roller center; reel tensions should be checked often in order to provide only sufficient tension for proper operation; and as has been stressed so many times, all parts of the projector, rewind tables, and projection rooms themselves must be kept free of all grit and dirt which could find its way to a point of film contact.

### *Case in Point*

The writer recalls one unusual case of film damage which may be described as a deep emulsion scratch running diagonally across about one frame of film. The scratches were uniform in spacing at adjacent footages, but would vary in distance from about four feet to two feet apart between opening and closing portions of the reel.

The problem had serious implications in that at least one exchange had threatened to withhold service unless the damage was halted. Suffice it to say that the damage was traced to the rewinding operation. A certain type of welded-wire reel was in use by the theatre, and the points at which the spokes met the outer rim were not always smooth. Crew members had been holding the film in an upright position as it passed through the hand, and guiding it against the edge of the reel in order to obtain smooth rewinding. Obviously the remedy in this case was the smoothing of all reel surfaces, and the training of all projectionists to rewind smoothly without resorting to the extreme method described above.

Another cause of scratching on the obverse or "slick" side of the film is traced to the improper threading of the lower loop in certain older projectors which allows the film to drag intermittently on the bearing which supports the former hand-crank shaft. It is hoped that most of this type projector have been given honorable retirement along with other devices long ago outmoded.

But certain very popular types of optical soundhead will also produce severe scratching of the back side of film. It will be recognized that certain models of optical soundheads provide for a mounting bracket for a prismatic lens to bend the exciter beam toward the photocell. This mounting bracket will rub the back side of the film if more than four sprocket holes of slack is allowed between the lower projector feed sprocket and the soundhead constant speed sprocket. The writer has knowledge of scratching from this source, and has seen the bracket in question worn away over a period of years to a surprising degree. It follows that correct threading of the soundhead and, in fact, at all points in the projector will minimize scratching from this cause and others similar to it.

### *Edge Damage*

In regard to edge damage, it is remarkable to consider how much improvement has taken place in the last twenty years, principally due to the appreciation in the exchange and projection room that smooth and even reeling of film will eliminate edge damage during shipment. Yet we do find some damage resulting from the shipment of film which has been rewound "zigzag."

Everyone knows that the idea of the four-inch hub, 2000-ft. shipping reel was to allow the projectionist to take

---

**You Never Can Tell . . .**

. . . just how much you're going to be influenced by a movie. There are hazards in this business. Note:

It seems that the visiting dentists at the Greater New York Dental meeting at the Statler Hotel in New York City were watching a movie on hypnotism. The commentator droned on in a soft-voiced monotone while a dentist in the picture was lulling his woman patient into a hypnotic trance.

Then there was a dull thud. When the audience turned around, there was a young projectionist, Salvatore Arini, flat on the floor. They revived him by splashing water in his face.

But he still couldn't explain what had happened to him, except that: "I was watching that picture pretty closely."

up on the shipping reel during his last screening. This condition does not exist everywhere, for the simple reason that in some cases exchanges use bent reels which cautious projectionists will not use in a lower magazine. When exchanges receive an edge-damaged print due to this cause, they have themselves to blame for the foolish economy of using a faulty reel.

But projectionists offend also when by necessity or choice they hand rewind the film to be shipped. Certainly it behooves everyone worthy of his salt to be sure that each reel leaves his theatre smoothly wound, securely and properly banded, and *gently* lowered into the shipping container.

### *"Rain," and Causes*

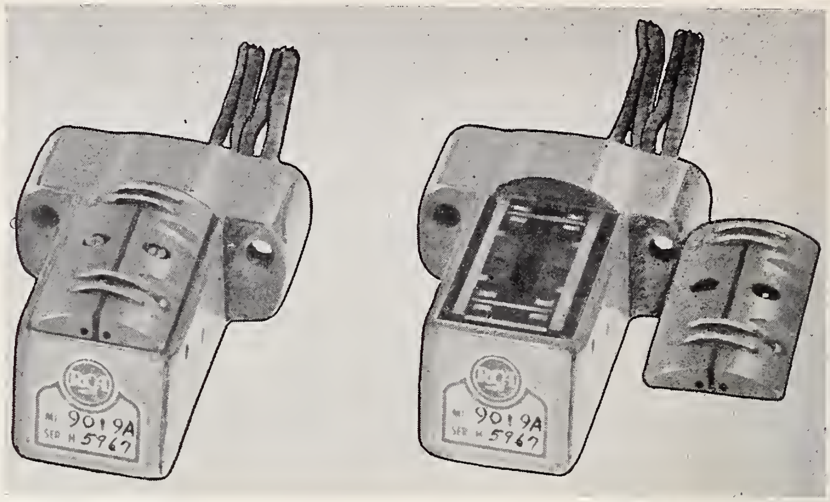
The condition known as "rain" is caused by shifting of adjacent film surfaces between which some foreign substance is located. It can be noted near splices, and can result from splices left gritty with stub scrapings. silica particles from sandpaper used to clean the stub or scraped end of a splice, or any foreign matter on the bench with which the film might have come in contact. This is tied up with cleanliness and proper rewinding at all times.

Projection personnel often drop the footage located between the motor start and cut cue on the floor or bench in order to measure the length present. This may be done by reference marks on the bench or by the "king's yardstick" of three feet equals nose-to-fingertip distance, more or less. One method comes to mind wherein the user held one cue mark in the right hand adjacent to his nose. Draping the film downward to the floor, he would stand on it, and bring a running end back to his nose. Total distance, a reliable eleven feet.

Smile if one will, it remains a fact that only two methods of verification avoid *any* dirt on the film. The first is to make use of a footage counter, and the second is to ascertain how many turns of the rewind handle move the desired length of film on a given hub.

For instance, many year ratios will move eleven feet of film on a five-inch hub in *exactly* two turns of the rewind handle; others will require three and one-half turns of the handle, and so forth. The important thing, appar-

(*Continued on page* 27)



MI-9019-A magnetic reproducing head with removable pole cap in place.

MI-9019-A magnetic reproducing head with pole cap removed.

# Clusters With Replaceable Pole Caps

By EDWARD STANKO

Manager, Engineering Section, Technical Products Division
RCA Service Company, Inc.

*(For those projectionists using the new replaceables, here are the recommended procedures for replacing and cleaning.)*

WHEN SOUND was first recorded on magnetic tape or film, the exhibitor was confronted with still another expense problem, that of replacing magnetic clusters after they had become worn to the point where sound distortion was taking place, or the film was rubbing on the pole piece frame.

In the production of sound from magnetic tape or film, the recording and reproducing heads are contacted by the tape or film on which has been deposited a fine ferrous oxide. When the film is running, this oxide acts like an abrasive and even though the particles are very small, considerable wear usually takes place when thousands of feet of film are run over the heads.

As with all devices that must be accurately machined and the overall adjustments maintained to very close tolerances, the CinemaScope reproducing head was a fairly expensive item, particularly since it was required to reproduce sound simultaneously from four sound tracks. This is equivalent to adjusting four optical tracks simultaneously and then locking them into place, once the proper position of adjustment was obtained.

In order to reduce the cost of replacing entire clusters, RCA developed the MI-9019A magnetic cluster with the removable cap. This was the first practical approach to lower the maintenance cost on magnetic cluster replacement and at the same time retain the high quality precision design. The new cluster looks like the original one except that the pole cap is fastened to the cluster body by dowel pins and two machine screws.

### *To Replace and Clean*

*Replacing Pole Caps:* Remove the entire cluster from the soundhead. Remove the two screws that hold the pole cap to the cluster. Carefully remove the pole cap from the cluster by sliding the edge of a knife or screwdriver under the pole cap. Replace the worn cap with a new one.

*Cleaning of Clusters:* Purchase a skein of white rug yarn. Cut it into 8-inch lengths. Use white yarn so that the amount and type of dirt can be determined.

Wet the center section of a length with carbon-tetrachloride and clean between reproducer heads using a "shoe-shine" motion. Study the type of dirt removed. If it is oxide, use another length of yarn and repeat until the oxide no longer appears on the yarn.

Use a similar length of 2-inch wide gauze and polish top of reproducers, using the "shoe-shine" motion, until the heads are polished and free of all debris.

# Motion Pictures and Color TV †

**Color film, which is apparently the answer to TV's current problem, has long been the acquaintance of the projectionist; here, a discussion of its application.**

THE CONTRAST range of the television system is severely limited as compared to that of a color motion picture on a theatre screen. The color film can reproduce a contrast range of about 100 to 1, whereas a color television picture on a home receiver is limited to about 20 to 1. Color film produced for television use must be made with this limitation firmly in mind, or the quality of the reproduction we finally see on the color TV receiver is a far cry, indeed, from the quality which the color television system is capable of reproducing.

It is for this reason that the subject lighting contrast must be kept lower for color motion pictures made for TV than for those made for theatrical presentation. Unless this is done, a severe tonal compression results, which eliminates shadow detail in the televised reproduction and seriously degrades picture quality. Ideally, lighting ratios of 1½ to 1, or 2 to 1 at most, should be maintained unless special lighting effects are desired.

The color television system, presenting a smaller picture and possessing considerably lower resolution capabilities than the theatre screen, requires that long shots, busy backgrounds and small detail be used sparingly. Close-ups are emphasized and "tightened" in films for TV use, in order to obtain sufficiently fine detail. Illumination levels must be kept high enough to allow stopping down the camera lens for adequate depth of field.

### *Color Limitations*

The color television system is an additive system, not a subtractive system. Thus, instead of generating color by means of dyes which subtract varying amounts of red, green and blue from the white light, it generates red, green and blue light by means of phosphors on the face of the color picture tube, combining these primary colors in the proper amounts to reproduce a scene. The green and blue phosphors are quite good for color quality. The red phosphor, however, is far from ideal; it emits red light which is too orange in hue, and lacking in saturation. This makes for weak reds, and distortion of hue and saturation of colors containing reds. Also, the light sources used for projecting motion-picture film for television transmission, known as film "scanners," use phosphors which suffer from similar deficiencies.

We are not trying to say here that color television is bad color, or that color film is good color. As we have already noted, color distortions are inherent in all color films and processes. But the distortions inherent in color television and those inherent in color film are different, and affect the final color reproduction of a scene in a different manner.

Color television is limited in brightness, and can reproduce saturated colors only at relatively high brightness levels. Conversely, color film has a much greater brightness range, but can reproduce saturated colors only at low brightness levels. Thus color film and color television are in a sense incompatible, for their color gamuts only partially overlap. This situation can be improved greatly by an electronic masking technique. Nevertheless, if a color film is properly planned and photographed for television presentation, a much better reproduction will be brought to the TV screen.

High-key lighting results in the most consistently pure color reproduction. Low-key lighting is far less predictable for color, and tends to give a muddy reproduction. Uniformity of lighting in the "playing area" of a screen is essential for television, for small variations in illumination can result in exaggerated deviations in the fidelity of color reproduction. Colored lighting effects must be used carefully, as they often make a black-and-white TV picture from the color film very confusing.

### *Kinescope Recording*

Motion-picture film is used by the television industry not only as a source of original program material, but also as a means of recording television programs for later transmission.

In the first instance, live action has been photographed and reproduced on film for television transmission, just as it is photographed and reproduced on film for theatrical presentation. In the second instance, film is used to photograph a television reproduction of live action by photographing the images on the "face" of a TV picture tube. This yields a photographic copy which can be used for later TV broadcasts. Such photographic copies are known by various names such as kinescope recordings, television transcriptions, telecine recordings, etc.

The use of kinescope recordings has had a tremendous impact on black-and-white television programming. It has enabled small, non-interconnected stations to transmit big network programs at time periods most suitable to their own operation; and it has permitted sponsors and agencies to enjoy a certain amount of freedom in scheduling their shows throughout various sections of the country, as required by time-zone differences or the needs of regional advertising campaigns.

Kinescope recordings are also vital to the operation of network programs which must be broadcast at a specific time in each time zone. Let us suppose that a program must be "on the air" at 7:00 p.m. across the country, and that the program originates in Hollywood. It is broadcast live at 4:00 p.m. Pacific time for New York reception

† From "Elements of Color," SMPTE, NYC.

## The Southern Gesture

In spite of certain comments lately about Confederacy conduct at Gettysburg, The South Shall Rise Again. Latest example of cotton-belt ingenuity was the action taken by 41 owner-exhibitors in Memphis. A local ordinance permits licensed projectionists and theatre managers in projection rooms during show times, but not owners. Rather than ask a change of law, the valiant 41 took the written and practical tests for licensed projectionists. As new license-holder M. A. Lightman, Jr., Malco executive, puts it: "We owners thought it a good idea to be able to go into the booth legally."

To the Memphis owners IP extends a rousing chorus of "Dixie."

at 7:00 p.m. Eastern time. It will have to be kinescope recorded in Chicago (6:00 p.m. Central time) for transmission 1 hour later; in Denver (5:00 p.m. Mountain time) for transmission 2 hours later, and in Los Angeles for rebroadcast 3 hours later. These and many other uses of kinescope recordings make them an integral part of any large television operation today, and it is conceivable that the value of color television recordings will be of even greater significance.

### Color Kinescope Recordings

One of the easiest ways to make a color kinescope recording is to photograph a color TV picture using a multilayer color film. The film can be either a color reversal film, which will produce a color positive kinescope recording, or a non-reversal color film, which will produce a color negative kinescope recording. Interestingly enough, it makes little difference to the television system whether it "sees" a negative or a positive image, for by the simple flick of a switch, TV can make a positive image out of a negative image electronically. Good, high-quality kinescope recordings of color television programs have been made on both 16-mm and 35-mm multilayer color motion picture films. These recordings are then reproduced by means of color film scanners.

We mentioned earlier that the television industry was experimenting with additive color processes for color reproduction. These processes are especially interesting for kinescope recording not only because they use inexpensive black-and-white film which is quickly and simply processed, but also because additive processes are fundamentally more compatible with the color television system, which, as we have seen, is itself an additive color system.

Briefly, an additive motion-picture color process involves photographing through red, green and blue filters to produce three black-and-white separation positives. These positives can be obtained by photographing three strips of film simultaneously, as in the three-strip camera. Or, by means of a special optical device, a red, a green and a blue image may be reduced in size and fitted into the approximate area of a single 35-mm frame. This latter system, of course, requires only one strip of film. In either case, separation positives may be made by exposing onto black-and-white reversal film which yields the separation positives directly, or by exposing onto black-and-white negative film and printing separation positives.

To reproduce the original color scene, these black-and-white positives are projected with red, green and blue light, and the light which passes through the three images is combined to yield an additive color reproduction. If the three-strip system is used, some means must be provided for registering the three strips exactly.

With the single-strip system, the images are recombined by a special optical device similar to the one used during photography. The single-strip system requires a dimensionally stable film, and produces on 35-mm film a picture which is less sharp than a 35-mm three-strip system. The fundamental reason for the difference in sharpness lies in the fact that, since all three records are reduced in size to fit into the approximate area of a 35-mm frame, we have in effect a 16-mm rather than a 35-mm print. But because the television picture is small compared to a theatre picture, this difference in sharpness may not be significant.

### Lenticular Film

A method of producing color motion pictures by means of a single strip of black-and-white film is the use of lenticular film.

Novel, but by no means new, lenticular film is a single black-and-white emulsion coated on a base which has been embossed on the non-emulsion side with a structure of tiny half-cylinder-shaped lenses or "lenticules." These are placed across the film and have a radius of curvature of about 1/500 of an inch. This structure of lenticules presents an appearance much like a washboard with each individual lenticule acting as a miniature cylindrical supplementary lens.

Lenticular film is exposed "backwards"—that is, through the base. The camera lens images a scene onto the lenticular structure of the base rather than directly onto the emulsion, as is usually the case. Each of the tiny len-

(*Continued on page* 27)

**A fortuitous accident(?) has developed what may be a large boon to exhibitors and projectionists; an optical track completely covered by a magnetic line may be played through with good quality and volume.**

## Optical? Magnetic? Now Compatible

MAGNETIC and optical soundtracks can be combined on one print and either track played at will through a revolutionary new procedure discovered by accident by George Lewin of the Army Signal Corps. It will no longer be necessary to use half-width tracks when optical and magnetic recordings are to be combined. Half-width tracks give poorer quality, and impose uneven head wear on magnetic reproducers.

With this discovery, the same print can be circulated to theatres that are equipped and are not equipped for magnetic reproduction; and played in any theatre according to that theatre's equipment or the preference of its management or its projectionists. In non-theatrical applications the new process has obvious advantages in multi-lingual work, for example.

The accidental discovery was made on a 16-mm print carrying a half-width optical recording and a half-width magnetic recording side by side. Through a fault in the striping machine the half-width magnetic track was misplaced and completely covered the optical recording. None the less, when the film was played on a projector equipped for optical sound only, the optical track, covered and hidden by the overlying magnetic material, sounded fine!

### Lead-Sulfide Unit Used

The projector used was a military model, embodying a lead-sulfide photoconductive cell in place of the more common, commercial caesium photoelectric cell. The lead sulfide unit is more sensitive to infra-red light. The iron oxide magnetic stripe, which is perfectly opaque to the human eye and also opaque to a caesium cell, was found to be transparent to some frequencies of infra-red, and the lead sulfide cell was found to be highly sensitive to those same infra-red frequencies. The cell looks right through the iron oxide and sees the optical modulations.

To adapt this procedure to theatre use the only projection room change, apparently, will be to substitute a photoconductive lead sulfide cell for the photoelectric caesium cell.

**This month's discourse by our overseas projection expert tells how British technicians beat the problem of film mutilation, plus a description of the introduction of Technirama.**

# From the British Viewpoint

**By R. Howard Cricks, FBKS, FRPS**

IN EVERY country in the world where there are cinemas, print condition has always been a source of worry to the conscientious projectionist. You may be interested to know how we have combated the trouble in Britain.

In the years before the war the position was really serious. The projectionist who wanted to put over a first-class show had to reckon on spending several hours at the rewind bench before the films were fit to show. I can claim to have made some contribution towards improving things by a campaign which I ran month in and month out in the *Ideal Kinema*.

But in general, the trade was rather indifferent towards it. During the war, both the patriotic aspect and the high cost of replacing damaged prints effected some improvement In projection for the Army, which was my chief wartime interest, we were able to give effective training, and print damage was a matter of military discipline.

There are three aspects to this question of print condition. First is the care which a renter takes of his prints. Second, the damage caused in the cinema by faulty equipment. Third and most vital, is the efficiency of the projectionist.

### *Print Damage Committee*

Practically every cinema has installed new projection equipment since the war, and the quality of modern machines rules out faulty equipment as a cause of film damage. Biggest factor in improving matters has perhaps been the formation by the Kinematograph Renters' Society (the all-powerful association of the film exchanges) of the Print Damage Advisory Committee. Under the chairmanship of the former assistant secretary of the KRS, this committee included representatives of every interested section of the trade: the exhibitors' association, the circuits, the projectionists' union, the manufacturers, the laboratories, with myself included as a representative of the *Ideal Kinema*.

Our object was education, not coercion. However, first one or two of the exchanges had to mend their ways. It was established, for instance, that some print managers refused (generally on higher orders) to have their first-run copies waxed; it was laid down by the committee that, no matter what other processes might mave been used such as the Peerless process, waxing was still necessary, and today it is universal. The only argument nowadays is how much wax is needed.

We also brought about some improvement in the matter of print examination between bookings. Unfortunately, the direct cross-over (when a print travels from one cinema to another, without being returned to the exchange) is still an obvious difficulty. Another problem is shortage of time; many prints arrive at the depot and are shipped out again within a matter of an hour or so. The answer is of course more copies—but copies cost money.

The cooperation of other organizations in the industry was sought. The Film Laboratory Association disciplined some of their members who were rather lax in regard to change-over cues on prints; with a big-hearted gesture they acceded to the request of the projectionists that all splices should have a ⅛-inch overlap, although this entailed the alteration of most of their splicers, and notwithstanding the fact that they themselves were not convinced that the narrow splice was unsatisfactory.

In spite of the improvement in the standard of cue dots, there were many projectionists who preferred their own private form of cues. I have seen illustrations of identical cue marks in *IP*, indicating the one-track minds of such offenders. The British Kinematograph Society (our SMPTE) and the Cinematograph Exhibitors' Association cooperated in arranging a number of lectures to projectionists, at which they were given technical information on many subjects, notably cue dots and safety base.

The Kinematograph Manufacturers' Association followed up one or two complaints (in fairness it must be said of a very trivial nature) relating to projection equipment.

In those days the exchanges sent out films in 1000-ft. reels, which practically every projectionist doubled up in order to project them as 20-minute reels. When a pair of reels was spliced together a couple of frames were lost, and again when they were broken down for return to the exchange—and not every splice was perfect.

The British Standards Institution prepared standard specifications (Nos. 1492:1948 and 1587:1949) for a 2000-ft. film reel and a corresponding spool, 15 inches in diameter. Notwithstanding the heavy cost of scrapping all their 1000-ft. cans and transit cases, exchanges cooperated in doing so, and today only a few old films distributed by the smaller exchanges are still despatched in small reels. This fact alone has resulted in a very considerable reduction in mutilation.

### *Major Causes of Print Damage*

In studying the question of print damage in the cinema, the Print Damage Advisory Committee first studied the matter statistically. A form was prepared on which the print manager of each exchange reported on any damage. These forms were summarized,

**CRAFTSMEN ABROAD**

**This month our personality from England is Sydney Swingler, chief engineer of Circuits Management Association, a member of the Rank coterie.**

**Swingler started his career as a projectionist with the late Oscar Deutsch,**

Sydney Swingler

**founder of the Odeon circuit. Nowadays Swingler has over 500 theatres in his charge, and it is said that his memory is so prodigious that he can remember every detail of each.**

and a number of interesting facts came to light. One fact still unexplained was that year after year, print damage rose to two strong peaks during the summer months.

By far the most costly form of damage was scratching, which accounted for half the total number of reports. Next came torn or strained perforations, about one-third of the total. Of all the causes to which damage was attributed, the most frequent was a dirty gate. Innumerable other factors were included: splicing safety base, problems of magnetic prints, changeover cues, transport, etc.

As a result of these meetings, a series of leaflets was prepared for the education of the projectionist. They were printed on bright yellow paper, and were slipped into films cans by the exchanges.

It would not be fair to say that print damage is a thing of the past, but the position has enormously improved. The Print Damage Advisory Committee has not met for 18 months. which presumably indicates that the exchanges are satisfied with the manner in which films are being handled. The stream of correspondence I formerly received, each letter enclosing a bundle of film clippings as horrible examples, is a thing of the past.

In this imperfect world one would not expect print condition to attain perfection. But at least we are all print-conscious.

▲

## TECHNIRAMA DEBUTS

The world premiére of Technirama—whose principles were described in my former article—was held on Saturday June 1, at the Leicester Square Odeon, in London's West End. The big theatre was filled with 2500 representatives of every section of the industry, and—surely unique for a trade audience—one of the sequences was greeted with applause in recognition of its superb photography.

Dr. and Natalie Kalmus received their guests at a party after the show. Present too were Dr. Bouwers, of Oude Delft, inventor of the Delrama camera anamorph, many studio people who have worked on the process, and a collection of stars.

First the system was explained in a short film by ace cameraman Jack Cardiff, who filmed "Legend of the Lost" in the new process, and is now working on "The Viking". In the camera a standard 35-mm. film runs horizontally, exposing a double frame just like VistaVision. By means of the Delrama anamorph the image is given a compression ratio not of the orthodox 2 to 1, but 1.5 to 1. From this negative prints can be made by contact, for road shows and drive-ins; additional anamorphosis can be inserted in printing to provide a print compatible with CinemaScope; or the picture can be un-squeezed to give a print compatible with VistaVision.

The GB-Kalee double-frame Technirama projector. Compare with the Micronlambda soundhead (IP, May, p. 21).

We saw a brief shot of the standard G. B.-Kalee projector fitted with the Varamorph, and a number of film sequences were shown in standard CinemaScope format. First film in the world to be released in Technirama was "Monte Carlo Story", and the first British film in it is "Davy"; sequences from these films and many others were included.

The screen masking closed in to a 1.75-to-1 ratio, and we saw unsqueezed prints projected; there was surprisingly little loss of quality. Came another shot of the projection room, this time showing the G. B.-Kalee double-frame projector with the unique Taylor-Hobson optics; this system differs from normal in that, instead of expanding the picture laterally the anamorph compresses it vertically. The backing lens needs to be of shorter focal length, and this has been taken care of by the development of a special series of short-focus lenses, known as Vistatal.

Among the sequences shown in double-frame were some remarkable stage scenes from "Escapade in Japan," in which the Japanese chorus girls, in brightly coloured costumes, were lined up across a huge stage, from one side of the picture to the other. Also shown double-frame was the sequence that drew applause: only a test shot in the early days of Technirama, of ski-ing in the Swiss Alps, but a superb piece of photography, with the dazzling gleam of the snow and breath-taking views of distant mountains.

The whole audience was in agreement that Technirama represents the finest wide-screen process yet developed. It brings us back to the quality of five years ago which we lost when the screen became larger. In America the drive-in owner will, I am sure, especially welcome it, because double-frame Technirama should solve his projection problems.

Obviously in theory the double-frame print should be capable of even finer definition than CinemaScope style prints; but the 45ft. screen of the Odean was not large enough for us to see the difference. It will take the screen of a drive-in to justify the larger format.

### *Warning to Projectionists*

But there is one warning I must give to the projectionist: Technirama, because of the almost unbelievably fine sharpness of the print, places a heavy burden upon the projectionist in translating this sharpness to the screen. At all demonstrations I have so far seen—even on comparatively small screens in studios—a remote control device (similar to that used on a Technicolor camera) has been operated by somebody in the audience to keep the picture always sharp.

It would need a man with an eagle eye to keep a picture in such sharp focus from the projection room. I visualise a focusing telescope, such as that fitted to the Simplex XL, becoming a necessary adjunct to the projection room.

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## New Mag Sound Stripers

Magnetic Sound Striping Co. has been appointed by the Minnesota Mining and Mfg. Co. as its representative laboratory in New York City for both amateur and professional movie film striping. The company, located at 1472 Broadway, New York 36, N.Y., promises magnetic sound striping added to films within 48 hours of receipt. Tape used is the newly improved Scotch brand.

# LETTERS TO THE EDITOR

**Tracing the American and foreign origins of a once popular system of arc lamp optics no longer in vogue here.**

*To the Editor of IP*:

May I correct the following misstatement on page 9 in the February issue of IP:

"*Mirror Systems* . . . the one employing a large converging lens *in addition to a mirror* was first used more than 25 years ago in Motiograph low-intensity reflector arcs and in a few lamps of European manufacture."

The facts of the matter are that the original Peerless low amperage reflector arc lamp (15-30 amperes) was in design in October 1923; it was in production and being shipped in September 1924.

The writer personally knows that the Motiograph lamp referred to by Mr. Mitchell was in design in the early part of 1925. Now 25 years ago, according to Mr. Mitchell, would place the Motiograph lamp as being developed in 1932. I believe that you should publish a note of correction as at the time the original Peerless low amperage reflector-condenser lamp was on sale here in the States as a domestic product. The only foreign lamp which also used the same optical system was the original German Hahn-Goerz "Aristol."

CHARLES A. HAHN

J. E. McAuley Mfg. Co.

## Robert Mitchell's Reply:

Grateful as I am for the dates supplied by Mr. Hahn, I feel that the time signified by "more than 25 years ago" includes both 1924 and 1925. I did not have these specific dates at the time I wrote the article; and with several makes of *still-used* European mirror-condenser lamps of the early nineteen-thirties in mind, I preferred not to be specific or to make claims of priority for anyone.

Be that as it may, the Germans were far and away the first in the field (as in most other cine technical developments, including the anamorphic lens). The combination mirror-condenser lamp was first used by Emil Mechau of Germany in 1910.

My first operating acquaintance with this type of lamp was with the Motiograph mirror-condenser lamp. This low-intensity lamp was also furnished without a condenser, in which instance an elliptical mirror replaced the parabolic mirror. I have also had experience with the Peerless LI reflector lamp, but without the condenser; and I am interested to learn that this lamp was also made as a combination model (as the Zeiss Ikon "Magnasol" models for both high- and low-intensity carbons still are).

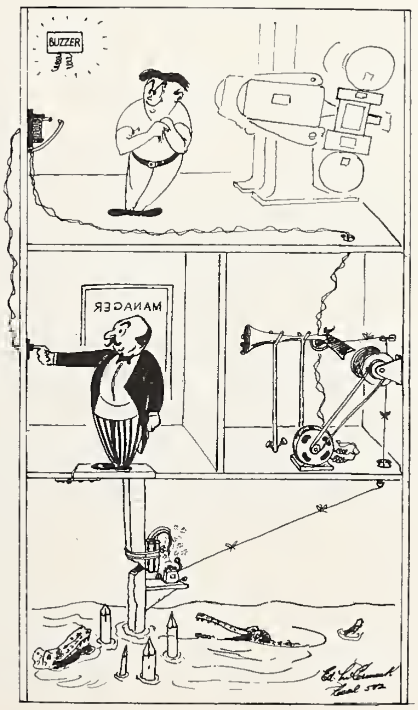
### *Artisol for Ernemann*

The original Hahn-Goerz "Artisol" which Mr. Hahn refers to was made primarily for Ernemann projectors, and was the forerunner of the present-day Magnasols. The firm of Hahn in Kassel, a subsidiary of the C. P. Goerz AG., Berlin, developed the Artisollampe, a mirror arc with condenser, in 1920. This German firm also made the first high-intensity arc lamp for motion-picture projection, the "Artisol 75," in 1923.

In regards to the use of strongly parabolized mirrors with large condensing lenses, such lenses are still supplied by the German firms of Bauer and Zeiss Ikon, the latter furnishing condensers of 500-, 700-, and 1000-mm focus for the Magnasol, which may also be used without lenses.

"By adding a condenser lens," says Zeiss Ikon, "the Magnasol mirror will acquire all the characteristics of a 'rubber mirror,' that is to say, it can readily be adapted to all practical projection conditions. This successful Zeiss Ikon mirror design assures an adaptability and luminous efficiency which cannot be surpassed by any mirror newly designed in the meantime. This is very clearly demonstrated by use of this mirror in a great many lamps of German and foreign origin."

### ANTICIPATION




### Balcony Smoking Problem

*To the Editor of IP:*

I have read your Projection Clinic article in the November issue of IP: "Beware of Inferior Projector-Port Glass." It is quite true that low quality port glass reduces and/or absorbs light output. The only remedy is good grade optical glass, as you mention.

Another big factor is balcony smoking, which impairs the quality of the picture. I notice this when the theatre begins to fill up, and be damned if we can clarify this. We have an exhaust system which gives a complete change of air every three to five minutes, but it is not sufficient to pump smoke out as fast as it forms in the balcony. Result: "foggy reproduction."

Any drive-in projectionist knows that when fog starts, the picture image is horrible. The same applies to indoor houses where smoking is allowed.

I strongly believe that observation port and lens port glass should be removed unless a good grade optical glass is used, and port hole blowers installed on each lens port. Try it. The result will be amazing.

I have been reading IP with a great deal of interest for the past three years, particularly the technical questions on present-day mediums.

J. F. RODGERS

Renfrew, Ontario

### Kudo For Miller

*To the Editor of IP:*

Will you please find room in your valuable magazine for this well-deserved pat on the back for Ritz Miller, whose fine article on panel marking appeared in IP.

This is an answer to those very few projectionists who blow their tops because switch panels are cleaned up. The only ray of sunshine in many of the dimly-lit, dingy, smelly booths one walks into is that the artistry shows that not Kilroy, but Ritz Miller was here.

The work that he is doing, giving his time and material, deserved real commendation. It is not only a hobby, but an important, essential task he has undertaken, reducing chances of error, making it easier for the projectionist, and consequently making for better projection.

NELS MATHESON

Los Angeles, Calif.

The function of this department is to provide a forum for the exchange of news and views relative to individual and group activities by members of the organized projectionist craft and its affiliates. Contributions relative to technical and social phases of craft activity are invited.

# In The SPOTLIGHT

LOCAL 162 MEMBER HONORED

W. E. Butler (center), retiring charter member of San Francisco Local 162, being congratulated by Local President Rexford Elder on the award of a gold life membership card. The presentation was made last month at the Local's regular meeting.

THE recent annual spring meeting of the New York State Association of Motion Picture Projectionists was one of the most outstanding events sponsored by this group. Attended by delegates from many of the projectionist Locals in the state and by representatives of leading projection equipment manufacturers, the meeting opened with a brief address by Association President George F. Raaflaub who introduced E. Francis Larham, president of host Local 108, Geneva. Larham welcomed the delegates and guests and invited the gathering to the buffet lunch and midnight banquet tendered by the Geneva Local.

The afternoon session was devoted to a series of educational talks and exhibits arranged by William H. Ingram, member of Rochester Local 253 and chairman of the Association's Educational Committee.

### *Technical Discussions*

Thomas Mulroy, sales manager and engineer for the Vicra-Lite Screen Division of the L. E. Carpenter Co., delivered a lecture on projection screen surfaces, illustrating his talk with a series of slides.

Willy Borberg, chief engineer for General Precision Labs., discussed the curved gate and its effect upon projection—the improvement of the screen image when projected with the curved gate at high light levels. Slides were used to demonstrate comparative moments showing film behavior in both flat and curved gates.

Bausch & Lomb Optical Co. was represented by H. H. Schroeder and Don Peterson, who discussed and demonstrated the Balcold reflectors. William Spooner of Lorraine Carbons, Boonton, N. J., offered his services free of charge to any theatre or projectionist experiencing difficulty in getting the maximum light from his arc lamps. All that is necessary is to drop a note to the company and Spooner will call at the theatre at the earliest possible moment and make suitable suggestions.

International Projector ran a film depicting the history of a motion picture projectors—from the days of the early Powers (forerunner of the Simplex), the Lubin, the Edison Kinetoscope, Dressler, Vitascope, Motioscope (later known as the Motiograph), etc., to the present day Simplex X-L. This film, incidentally, created much favorable comment and plans are being made to show it to other projectionist groups.

The Association held its business session in the evening with a general discussion on ways and means for improving its financial position. It was decided to hold the forthcoming fall meeting in Syracuse, and the Educational Committee is planning many surprises for the delegates.

## Back Issues of IP Available

Back issues of IP, dating from 1939 to 1951, may be obtained by contacting Dr. J. C. Burnett, Alpine, New Jersey. Dr. Burnett has advised us that these issues include complete files for the years 1940 to 1944, with one or two numbers missing for the other years.

• During their recent visit to New York, Charles K. Peters, Local 393, Corsicana, Texas and Mrs. Peters were the guests of Mr. and Mrs. Morris Klapholz (of 25-30 Club fame). This foursome had quite a time making the rounds and all parties concerned enjoyed the all too-brief visit.

• The motion picture industry in Mexico is threatened with an industry strike unless an agreement is reached between producers and film workers. A 50% boost in pay is sought by the Union of Film Industry Workers, the union claim-

N. Y. STATE ASSOCIATION HOLDS SPRING MEETING AT GENEVA

Group photo of delegates and guests at the recent meeting of the N. Y. State Association of Motion Picture Projectionists. Seated, left to right: Walter Scarfe, L. 376, Syracuse; Earl Tuttle, L. 396, Binghamton; William Ingram, L. 253, Rochester; Charles F. Wheeler, L. 108, Geneva; George F. Raaflaub, L. 376, Syracuse; James Brennan, IA 1st vice-president, and H. Paul Shay, secretary-treasurer, 10th District. Standing, left to right: William Spooner, Lorraine Carbons; Thomas Mulroy, Vicra-Lite Screens; Willy Borberg, General Precision Labs.; Arthur E. Meyer, International Projector; E. Francis Larham, L. 108, Geneva, and Roy Fisher, Ethyloid Film Cement.

# News and Views from District No. 2

By HANK BOLDIZSAR

Member, IA Local 150, Los Angeles, Calif.

*Our West Coast columnist describes several interesting and unusual projection room installations.*

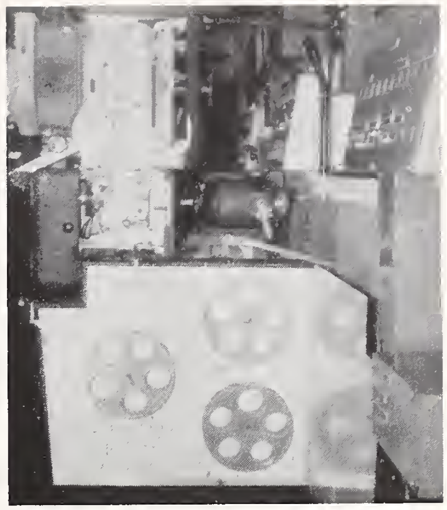
ONE OF the most desirable projection assignments out here on the West Coast is that enjoyed by Jimmy Phillips, member of Locals 150 (Los Angeles) and 165 (Hollywood), and projectionist at the Screen Directors' Guild in Hollywood.

The Guild projection room, which covers an area of 20 feet by 40 feet, is beautifully designed and equipment-wise leaves very little to be desired. The room is completely sound-proofed and is equipped with Simplex XL heads and Peerless Hy Candescent lamps operated at 160 to 200 amps. Two of these units are permanent stations, while the third is very flexible. The third unit is actually an experimental station; when a new process is to be viewed this unit undergoes a change of projector head or some associate part. (I understand that some new and exciting projection news is in the making—will let you in on that as soon as we get the green light.)

An Eastman Model 25, the neatest 16-mm projector package I have ever come across, is also part of the projection room equipment. This particular unit consists of an Eastman carbon arc lamp, rectifier, and an amplifier—all in one package, with the projector head completely enclosed. It projects a beautiful picture in both wide screen and CinemaScope.

### *Novel Installations*

The projection room at the Screen Directors' Guild is equipped to handle optical and four-track stereo sound, and is completely wired for the addition of Philips projectors and the six-track Todd AO system. A future installation of a TV projector will make it possible to show any process of film entertainment from this projection room—even "ye olde silent movin' pitchers" for which the XL heads have a second drive motor for 72 feet-per-minute running speed.



Unique lower magazine installed in projection room of the Screen Directors' Guild.

Two items of equipment that I found to be particularly interesting were the "focuset" and the take-up. The focuset is a gauge installed on the lens mount and facilitates pre-focusing of the lens before the picture is projected, thus insuring a clear and sharp picture with each changeover. A chart mounted on the front wall near each projector gives the proper gauge-setting for each lens. With heat filters installed between lamphouses and projectors, and a blower system cooling the projector mechanism, there is no drift (changes in alignment and distances of projector and optical parts due to excessive heat of the light source) problem to contend with.

The lower magazine and take-up assembly is quite unlike anything we theatre projectionists are accustomed to. This part of the equipment was designed by Jim Phillips and Jim Brigham, and was built in Brigham's electronic shop, The Sound Equipment and Accessory Co. of Hollywood. A roomy 25 inches high and 29 inches wide, this lower magazine easily accommodates the picture take-up and track feed and take-up reels for studio preview projection, and also the 3000-foot reel for television half-hour shows. This system is free of take-up belts or chains, and uses instead Bodine torque motors which provide perfect tension under all conditions.

These torque motors are energized by both the arc and projector motor circuit. When the rectifiers are turned on the water valves automatically open for the water cooling system, and the torque motors are slightly energized to take up the slack in the film. With the start of the projectors the little Bodines really get with it and take-up as nicely as you please. When the heads are shut off the arc circuit still maintains enough tension on the motors to take up the remaining tail and prevent a

(*Continued on page* 25)

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ing that the current contract which expires in July is due for a "normal" revision. It is expected that a compromise will be effected in time to avert a possible strike.

• Toronto IA Locals Nos. 173 (Projectionists) and 58 (Stagehands) will hold their annual picnic on June 16 at Lowville Park, located 33 miles west of Toronto on the No. 5 Highway.

• An agreement reached between San Antonio Local 407 and the management of the San Antonio Twin Drive-In located on East Loop No. 13 ended the several months old strike against the theatre. Gordon Dyer, president, was in charge of negotiations for the Local.

• The Theatrical Employees Association of Australia (TEA) is up in arms over American and British production units coming to that country to shoot pictures with a 100% technical crew brought over from their respective countries. TEA has ruled that its projectionist members will refuse to run pictures unless native technicians are employed in the production units. The union is seeking a quota of 75% for local workers and 25% for imported technicians.

It is said that the ruling was aimed particularly at certain British producers who made it a practice to import a technical crew from England to shoot exteriors called for in a script and then complete the interiors in their home studios.

• Syd Thomas, member of Toronto Local 173, has been working as a projectionist for a total of 42 years, 32 of them with the Famous Players of Canada. Thomas is chief projectionist at the Tivoli Theatre in Toronto where "Oklahoma" has been running for the past year.

• Francis Miller and Charles Nelson, members of Local 376, Syracuse, N. Y., are in charge of the Todd-AO projection room in the recently opened Kallet Circuit Shoppingtown Theatre in Shoppingtown, which is located three miles outside Syracuse.

Seating capacity of the new theatre is 1,010. Technical installation made under the supervision of Altec field engineer Murray Goldberg, incorporates a curved screen measuring 49½ ft. x 21 ft. The 70-mm film is projected at an angle of 128 degrees. Amplifiers are Simplex, the control rack is Altec. Five Altec Voice of the Theatre speakers are located behind the screen; 12 Altec 12-inch surround speakers are concealed, in six pairs, in bass-reflex concealments on ledges in the auditorium ceiling.

What Is YOUR Problem?

# Projection CLINIC

## Mirror Magnification at Constant

*Is the magnifying power of an arc-lamp mirror different in the central and edge zones?*

AN ARC-LAMP manufacturing firm published a table to prove that different magnifications prevail over the surface of an arc-lamp mirror; optical firms manufacturing such mirrors disagree. So the answer to the above question is negative.

An arc mirror has an "elliptical" form; and one of the properties of an ellipse is that the sum of the two distances from any point on its circumference to the two foci ($F_1$ and $F_2$ in Fig. 1) is always constant.

Conventional reflector-arc optics are based upon the *ellipse* and its two foci, $F_1$ and $F_2$. Because the sum of the lengths of the two lines drawn from the foci to any point on the circumference is constant, the sum of the two dotted lines in the drawing is equal to the sum of the two unbroken lines.

A center cross-section of an arc mirror is a portion of an ellipse having one focus at the crater of the positive carbon and the other focus at the film aperture, as shown. These correspond to the two foci of an image-forming lens. Imaging of the crater as a "spot" is nearly perfect; and the properties of the system require definitely located foci and a constant degree of magnification by central and edge zones of the elliptical mirror.

In terms of projection, the distance from the positive crater to the surface of the mirror and thence to the film aperture is always the same, no matter whether we select a point at the center of the mirror or at its edge. This means constant magnifying power and nearly perfect (anastigmatic) imaging of the positive crater upon the film aperture of the projector.

### Power-Finding Methods

Different magnifications in different zones are a physical impossibility, forasmuch as one specific elliptical form produces two *fixed* foci, one focus being the place where the crater of the positive carbon is located, and the other focus being at the plane of the film aperture.

The magnifiying power of a mirror may be found by two methods. We may either divide the diameter of the aperture spot by the diameter of the light source, or we may divide the working distance (mirror-aperture distance) by the "geometric focus" (mirror-crater distance). The latter method is easier to use and gives more accurate results because of the ease of measuring the working distance and geometric focus.

Now, here is an interesting fact. It will be found, by measuring the magnifications of a large number of arc mirrors, that the magnifying powers of most modern American mirrors intended for use with 9-, 10-, and 11-mm carbons ranges from 5 to 6, while most German mirrors intended for use with the same size carbons have magnifications of from 6 to 7. Lower magnifications are found only in mirrors such as the Weule 540/180 intended for use with 13.6- or 14-mm positives. This special German mirror has a magnification of only 4.5 and a diameter of 21.26 inches, making it larger than any American mirror.

The reason for the higher magnifications of German mirrors is simply the use of correct optical principles, thus assuring more uniform screen illumination—about 75% side-to-center as compared with only 55% in the case of the newer American mirrors for 9-, 10-, and 11-mm positives.

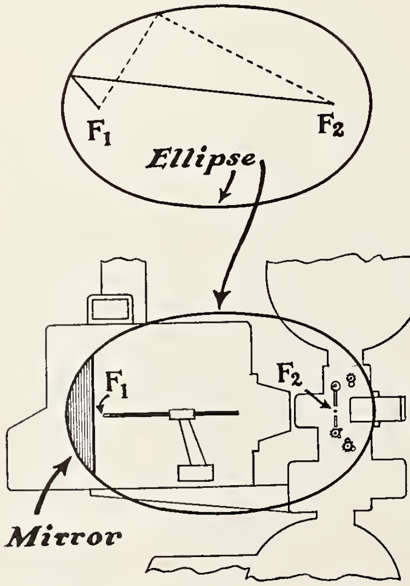



FIG. 1. A cross-section of the lamphouse as an ellipse.

## Magnification Under 5?

*How great should the magnifying power of an arc mirror be?*

THE GREATER the magnifying power of an arc-lamp mirror, the less deep its curvature, and the less strongly it bends the light rays it receives from the luminous positive crater. And because an elliptical arc mirror functions like an anastigmatic optical system, its focal properties and magnifying power cannot be changed (unless auxiliary lenses are used) without disturbing its anastigmatic characteristics.

As Fig. 2 shows, too small a working distanee for a given mirror creates a condition of "over-parabolization" while also decreasing the magnifying power, and too great a working distance creates spherical aberration while simultaneously increasing magnification. There is, however, a slight leeway in working distance permitted by most manufacturers, a longer-than-normal working distance giving a more uniformly lighted screen, but occasioning a small loss of total light.

### Working Distance

A properly positioned arc mirror will have one of its two foci at the positive crater and the other at the film aperture, as the top diagram shows. Shortening the "working distance," as in the middle diagram, necessitates moving the crater farther from the mirror, and produces a smaller aperture spot. The lower diagram illustrates the reverse effect of lengthening the working distance: the crater must be moved closer to the mirror, giving a larger spot.

Working distance may be varied within a range of from 2 to 4 inches (depending upon the characteristics of the mirror) to give the precise amount of crater magnification desired; but beyond these limits, the elliptical curvature of the mirror will no longer be correct, and light will be wasted.

Too short a working distance (middle diagram in Fig. 2) has the effect of increasing the "eccentricity" of mirror curvature in excess of the required degree. In addition to being too small, therefore, the spot may become brighter at its edge than at its center and have the appearance of a ring of light.

Too long a working distance (lower diagram in Fig. 2) has the opposite effect, decreasing mirror eccentricity below the amount required. This produces spherical aberration, a serious defect; and the resulting spot, in addition to being large, is diffuse with an extended

outer zone of "fadeaway." The manufacturer's recommendations should be heeded when establishing working distance, although experimentation is not amiss in the case of inaccurate pressed-glass mirrors which are not subsequently ground to the correct form.

The magnification provided by any arc mirror should obviously be just great enough to cover the entire rectangular opening of the film aperture with the comparatively uniformly brilliant central portion of the HI crater image—the "spot." Too high a magnification (too large a spot) wastes light and overly heats the projector mechanism: too low a magnification increases total light transmission, but gives "hot-spot" projection—a bright spot of light at the center of the screen with dim, discolored edges and sides.

### *Best LI Light: 3/4 Carbon Diameter*

It has been found that the average effective light source in low-intensity arcs is about 3/4 the diameter of the largest positive carbon intended to be used in the lamp. (Increasing the current in LI projection merely increases the diameter of the positive crater until it is about 4/5 the diameter of the carbon, when "spindling" occurs.) In high-intensity projection, however, strikingly different brilliancy-distribution characteristics of the crater require us to regard only the central part of the luminous gas ball held inside the crater by magnetic forces to be the effective light source. The dim, reddish light emanating from the incandescent shell of hard carbon surrounding the core is useless for projection, but very hot.

Some designers base their mirror-curvature calculations upon the entire diameter of the positive carbon, a cause of unpleasing, film-blistering hot-spot screen illumination. Other designers regard the diagonal of the effective 35-mm film aperture as close to 30-mm (it is actually 25.4-mm = 1 inch) and take 1/2 the diameter of the HI positive as the diameter of the light source. For 9-mm carbons, therefore, mirror magnification should be 30/4.5 = 6.7; for 10-mm carbons, 30/5 = 6.0; and for 11-mm carbons, 30/5.5 = 5.5. Only when the carbon diameter exceeds 12-mm do we find magnifications of less than 5 required.

## Focus the Emulsion Layer

*A few of the fellows seem to think that either the background or the foreground of the picture can be focused sharply on the screen but not both. It seems to me that when one area of the picture is focused, all other areas will automatically be in the sharpest possible focus.*

YOU ARE RIGHT: the fellows who think that either background or foreground can be sharply focused, but not both at the same time, must be cameramen in disguise! The cameraman, unless the foreground object be beyond the "infinity focus" of the lens he is using, can focus sharply only one or the other, and must make a choice. This is because foreground and background are at different distances from the camera. As a rule (as in a closeup), the foreground object is focused clearly, making the unimportant background more or less fuzzy on the finished film.

In projection, however, *both* background and foreground are at the same distance from the lens because both lie in the same emulsion layer of the film. All that we projectionists really do, when we focus the picture, is bring the microscopic silver grains of the film emulsion into the sharpest possible focus.

If the background is blurred, it's simply because it is out of focus on the film. *You can't make the picture on the screen clearer than the picture on the film!* The blurry background will be at its clearest when the sharply delineated foreground is in focus, but you can't sharpen a blurry picture when it has been photographed that way.

### *The Necessary Blur*

Special camera lenses, as well as ordinary lenses "stopped down" to a small diameter, are used by the cameraman to bring *both* foreground and background into sharp focus simultaneously. Sometimes, however, it is considered desirable to blur the background detail in closeups by means of long-focus lenses used "wide open" to make the actor's head stand out more clearly from the relatively unimportant detail behind him.

It is also interesting to note that long-focus lenses have a smaller depth of focus than short-focus lenses; and large-frame negative processes require the cameraman to use lenses of longer focal length. Backgrounds in pictures made from VistaVision, CinemaScope 55, and Technirama negatives are sometimes apt to be more blurry than in normally photographed 35-mm films. The desired extra sharpness of big-frame negatives is nullified by the camera lens! We have yet to see a picture made from a big-frame negative that the moviegoing public can distinguish from standard 35-mm photography. (And we also have yet to see the consistent knife-edge sharpness of image that characterized the early silent films, flickery as they were.)

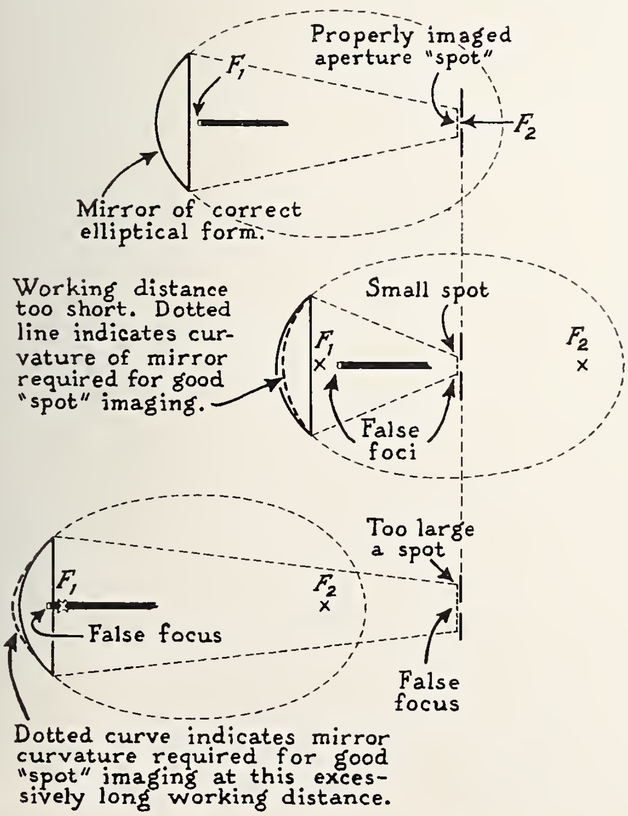



FIG. 2. True and false foci dependent on working distance.

## New Diffusing Screen

A new projection screen, tradenamed "Uniglow," has been announced by Radiant Mfg. Corp. of Chicago. Although its reflective power is claimed to equal that of a glass-beaded surface its diffusing effect and wide-angle reflection permit use of a 40 per cent wider viewing angle.

# Arc Lamp for Alternating Current?†

## By H. TUEMMEL

*(For those querying IP of late on the possibility of another introduction of an AC arc lamp, the following article from an overseas colleague should prove of interest. For a further word on Herr Tuemmel refer to the box on this page.)*

EVERY now and then the arc lamp fed by alternating current emerges from oblivion or is said to have been invented, although the problem of the AC arc lamp is as old as the arc lamp itself.

As there is hardly any DC mains supply left which has not been replaced by AC or three-phase current, it is without doubt a wonderful idea to use an AC fed arc lamp which needs no rectifier but only a transformer or a resistor. The initial costs are also much lower than those of a DC arc lamp. However, this appears to be the only advantage, in contrast to which there is quite a long range of disadvantages which derive from the nature of the AC arc.

As is well-known, the positive carbon of a DC arc lamp forms a strong crater the radiation of which is used for the production of light. On the other hand, the radiation of the negative carbon is negligible and is not used for the production of light. With the DC arc lamp the positive crater in itself is a powerful source of light no matter whether solid carbons or HI-carbons are used.

Such a crater cannot be formed in an AC arc lamp simply because the direction of the current changes 50 times per second. The load of both carbons is, therefore, equal and for this reason carbons of different diameter, as used with DC arc lamps, cannot be employed. A powerful crater cannot be formed and for this reason the incandescent points of the carbons cannot be utilized to produce light, which leaves only the light-arc itself as a source of light. To increase the light intensity of the arc special carbons are used containing luminous salts, which are known by the name of "effect carbons."

Both carbon points are heated uniformly by the current but, as this energy cannot be utilized to produce light, as with the DC arc lamp, the effectiveness of the AC arc lamp is much less than that of a DC arc lamp. In other words: a DC arc lamp fed by 50 amps will supply more light than an AC 50-amp arc lamp. According to the local conditions, up to 50 per cent or more additional electric power must be fed into the AC arc lamp to yield the same light intensity as a DC lamp.

†From "Bild und Ton," Zeizz-Ikon, April 1957.

Apart from its considerably lower output the AC arc lamp has still another inconvenient disadvantage. Its light will pulsate with the rhythm of the AC frequency.

With a mains supply of 50 cycles the light will change 100 times per second, since the negative half-cycle of the alternating current produces the same light impulse as the positive half-cycle, so that the 50-cycle full wave of the mains will produce 100 light pulsations per second.

This changing light of 100 cycles, however, beats with the rotary shutter of the projector and these vibrations will be disturbingly noticeable on the screen as relatively slow light-dark fluctuations on the screen. These beats can be reduced or even eliminated when the AC arc lamp is operated by a frequency other than 50 cycles, which, on the other hand, should have quite definite relations to the projection frequency of 24 frames per second. This means the acquisition of a frequency converter, the initial cost of which is considerable and the effectiveness of which will reduce still further the insufficient output of the AC arc lamp. It has also been suggested that a projection speed of 25 frames per second should be used in order to avoid the beat frequencies.

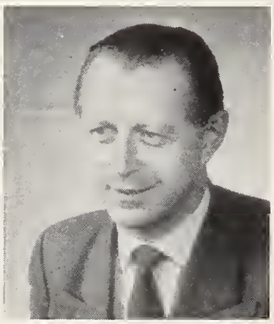
During the period of the silent film this was done occasionally, but nowadays it is impossible to do so, since the speed of the sound film has been internationally agreed upon as being 24 frames per second; at other speeds the sound reproduction would be impaired.

All these disadvantages of the AC arc lamp have so far prevented its introduction into the equipment of the cinema.

### Tuemmel With Zeiss 25 Years

Herbert Tuemmel, technical manager of Zeiss Ikon, is celebrating his twenty-fifth anniversary with that firm. Tuemmel is well-known internationally through his various publications, lectures, and articles in technical periodicals. He is also editor of the Zeiss Ikon publication "Bild und Ton" (Picture and Sound).

Comparatively young (48), Tuemmel has crowded many activities into his



Herbert Tuemmel, Zeiss Ikon

career. Besides his technical writings, he has contributed a number of improvements to the motion picture industry through research works and developments in the Zeiss cinetechnical laboratories. He is also a member of the Professional Cinematographic Committee, and the German Cinetechnical Society. With the managing staff of the Ernemann works in Dresden until 1946, Tuemmel then went to the Zeiss plant at Kiel where, after controlling the whole technical outdoor service, he was given procuration.

## PERSONAL NOTES

GERALD R. SAUER, field engineer with RCA since 1950, has been appointed Project "SAGE" Engineer for the firm at Topsham, Maine. SAGE stands for Semi-Automatic Ground Environment, the Maine facility being one of many forming a chain of radar defense systems across North America. Each site contains electronic computors handling data reported by Texas towers, picket ships and aircraft of the Air Defense Command. Mr. Sauer will direct staffing of the Topsham site, and formulate training programs for civil service and Air Force personnel assigned to the project.

* * *

H. M. BESSEY, executive vice-president of Altec Companies, Inc., has retired effective June 30, remaining as a member of the board of directors. This announcement follows on the recent appointments of C. S. PERKINS and MARTY WOLF to the respective posts of general manager and assistant general manager of Altec Service Company. A testimonial dinner was tendered Bessey June 5 in New York, Altec executives and personnel from coast to coast honoring the retiring top executive.

Joining Altec in 1937, following a successful career in the banking and accounting field, Bessey occupied several posts of importance until his appointment as executive vice-president in 1943. His responsibilities in that post included supervision of sales, operations, engineering, accounting, personnel, publicity and advertising departments, together with representation of the company's interests in numerous union negotiations.

* * *

A. C. LINDQUIST will fill a newly created post as manager of the Distributed Products Merchandising, Theatre and Industrial Products department of RCA Com-

mercial Electronic Products. Formerly manager of New Business Coordination, Lindquist will be responsible for planning, pricing, and merchandising of a broad range of equipment which the RCA Theatre and Industrial Products department markets through distributors. This includes RCA sound, projection, and furnishings equipment for indoor and drive-in theatres: industrial and school sound systems; 16-mm sound-film projectors; electronic hi-fi components; industrial and business intercom systems; and RCA "Antenaplex" community TV equipment.

* * *

Joseph L. Langevin succeeds H. A. Baldwin as facility manager of RCA Service Co., Tucson, Ariz. In his new post he will be responsible for coordination of work performed under combat surveillance and technical writing contracts. A West Point graduate, Mr. Langevin retired with the rank of colonel after 34 years of service, joining RCA as a systems engineer in 1955. He served in World War II and in Korea; and his decorations include the Legion of Merit, Bronze Star, French Croix de Guerre and Italian Medal of Valor. His predecessor, H. A. Baldwin, becomes administrator, Atomic Energy Services, Government Service Department of RCA.

## BOOK REVIEW

Elements of Color in Professional Motion Pictures, *SMPTE*, 1957, 104 pp., $3.50.

Prepared by a Special Committee of the SMPTE under the chairmanship of Wilton R. Holm, this volume is the best and most up-to-date source for the subject of color in motion pictures. What impresses the reader first is the makeup, a clear, clean text, and approximately 100 brilliant color photographs for the book's 104 pages.

Under 12 chapter headings, ranging from color fundamentals to actual processing and printing, and including a chapter on color TV, this small book is amazingly complete. Born of a request about two years ago for a basic treatise on color in motion pictures, the 21 committee members have, by means of recasting here and there, kept a unity of style that should be helpful to the layman.

Illustrations have been supplied by DuPont, Kodak, MGM, Paramount, and Technicolor. Although originally intended especially for the non-engineering personnel who work in color movies, this book is highly recommended to anyone who wishes a basic text on a complicated subject.

# New Products for the Industry

A New Bulletin describing the Vicra-Lite Screen made by L. E. Carpenter Company has just been issued. It may be obtained from the company's headquarters in the Empire State Building in New York City.

The bulletin describes in detail the vinyl plastic, lenticular screen that was originally produced for CinemaScope. A "Nichro-Weld" process of seaming is said to assure uniform aligning across screen. The screen comes in two types—for theatres with head-on projection, and for houses with a 10-degree angle or more.

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Wall Chart of Conversion Factors is now available from Precision Instrument Company, 3714 No. Milwaukee Ave., Chicago 41, Ill. The chart, designed for use by engineers, technicians, and shop men includes all common conversions such as inches to centimeters, or watts to H.P., as well as some conversions difficult to locate in reference manuals. (An example would be atmospheres to Kgs/sq. cm.)

Conversions are listed in alphabetical order rather than by measurement subject.

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Carbons, Inc., of Boonton, N. J. offer free test samples of their newly developed spotlight carbons. These carbons have been adopted by most producers on Broadway, New York City and by all leading Las Vegas night clubs, according to Carbons, Inc. Trims are available for all spotlights of the Strong Trouper and Super Trouper lines, for all four models of Genarco's high intensity Metro-lite spot lamps, and for Peerless Hy-Candescent lamps. Ed Lachman, president of Carbons, Inc., says these carbons were developed for use where the highest possible quality of pure white, steady non-flickering arc illumination is indispensable.

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Suited to lobby or marquee displays, a new still projector just announced by Projection Optics Co. of Rochester, N. Y., can be placed directly on the object to be projected, such as the photograph of a star or a still display picture, and any selected 11 x 11 portion thereof can then be displayed on any size screen at any distance. Designated Transpaque II, the device can project 10 x 10 transparencies as well as 11 x 11 opaques. It serves as a rear projector for displays to be shown on the translucent facade of a marquee. Available lenses come in focal lengths from 4 inches to 40 inches.

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Autotransformer type lighting dimmers and controls, in the 6,000 to 15,000 watt range, are described in an illustrated 28-page brochure issued by Superior Electric Co. of 83 Laurel Street, Bristol, Conn. The control units described in the brochure are self-contained, packaged assemblies, recommended by the manufacturer as ideal for theatre purposes. Special features are explained, and ratings and data fully set forth.

## OBITUARIES

Barkhaus, Otto 63, member of Local 486, Hartford, Conn., died several weeks ago. He worked as projectionist for the Stanley Warner Theatres for the past 30 years.

• • •

Ester William, 86, and George B. Leavens, 65, members of Local 253, Rochester, N. Y., died recently. Mr. Ester was a charter member of the Local and had

been retired for a number of years. He is survived by three sons and three daughters. Mr. Leavens suffered a heart attack while preparing to cover his job at the Waring Theatre in Rochester. A son and daughter survive.

## DISTRICT NO. 2

(*Continued from page* 19)

build-up of spilled film in the magazine. These little gems also double as rewinds.

Incidentally, fellow aperture changers, it might surprise you to learn that Jim Phillips uses 10 different apertures in his projection work—he handles aspect ratios we haven't heard of yet.

Another innovation developed and installed in the Guild projection room by Phillips is a very ingenious screen masking control circuit that permits pre-selecting any desired screen size. A selector box is mounted on the booth panel with the dial calibrated to the several screen sizes and the degree of curve used. The required screen size can then be pre-selected and on change-over all one has to do is to hit the control switch and the masking automatically moves to the correct spot.

The control circuit also has a vernier adjustment for odd screen sizes not available on the selector. The maximum screen size is 52 feet by 28 feet, although picture size with standard conditions (what's standard these days?) is 34½ feet by 18 feet, using a 1.85 aperture.

A sound control station with master gain control and an individual control for each of the four mag tracks with a plus or minus 10 range is located in the auditorium of the Guild building. Every station in this building, which is an architect's dream, can be reached by intercom.

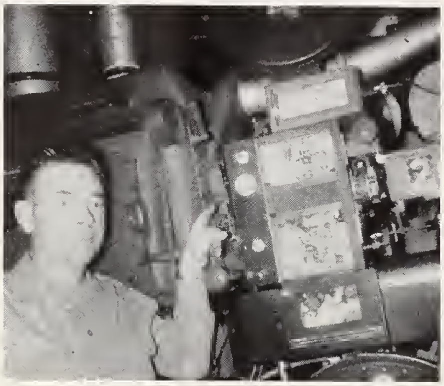
With the introduction of the powerful arc lamps, so necessary for drive-in projection in particular, the old problem of buckling and blistering caused by heat on film has been aggravated. INTERNATIONAL PROJECTIONIST has carried many fine articles dealing with this industry problem.

### "Cinemair" Film-Cooling Unit

However, as far as this writer is concerned heat on film ceased to be a problem back in 1953 when Harry Cole, member of Los Angeles Local 150, developed his film-cooling unit—the Cinemair. He installed this unit in the projection room of the Century Drive-In Theatre in Inglewood, Calif., where he is employed, and maintenance during the four years of operation has amounted to nothing more than periodic lubrication of the motors.

For his experimental model Harry

used the refrigerator unit from a Servel window cooler. His present model, which he designed and developed with the aid of a refrigeration engineer, is a highly efficient unit neatly packaged and delivering 1500 cubic feet of refrigerated air per minute into the projector head.



Harry Cole points to his film and projector cooler, Cinemair, which he installed four years ago at the Century Drive-In Theatre in Inglewood, Calif. Thermometer on the Brenkert projector head reads the temperature two and one-half inches from the aperture. The four-inch vent pipe, behind the magnetic soundhead, is for air intake from the cooling unit.

The air stream is directed on the projector back plate, the aperture, and on the film at the lower loop.

Measured 2½ inches from the aperture, the temperature in the head never rises above 90 degrees for a full 20-minute reel, and drops to 50 degrees a few minutes after shutdown of the lamp and head. The cooled mechanism eliminates film damage and the picture is always kept in focus. The intermission trailer Harry has been using every night for the past two years is still in perfect condition without a trace of film buckle.

With all my gallivanting around visiting theatres and studios I thought I was pretty well up on all the top-flight projection rooms in this area. However, I was in for quite a pleasant surprise when I called on Bert Moody, chief projectionist at the RCA laboratory in Hollywood. Here I saw one of the most interesting and versatile projection rooms I have ever visited thus far. Bert's projection assignments here are as varied as was our Southern California weather this past winter.

### *Projection at RCA Lab*

The projection room, like milady's unmentionables, is a two-way stretch job and is equipped with four projection units, each consisting of a BX-80 Brenkert (RCA) projector and a Brenkert ENARC lamp mounted on Brenkert bases. One pair projects into a recording stage with a 105-foot throw, and the other pair on the opposite side of the projection room projects into a preview room with a 50-foot throw. All units, including a 16-mm projector, are designed to run forward or in reverse and can be interlocked in any desired combination. The 16-mm head can also be interlocked with a 35-mm track.

In addition to general studio assignments such as daily rushes, recording and dubbing, music scoring, etc., Bert

Bert Moody at the power distribution panel in the projection room of RCA's lab in Hollywood.

also runs theatre features for previews, and audience reaction shows for half-hour TV productions during which laugh tracks are recorded for the program. These laugh tracks are tape recorded, feeding two recorders with mikes strategically placed in the auditorium. Among the many TV shows processed here are the Bob Cummings, Burns and Allen, Broken Arrow, and the Groucho Marx shows.

In the dubbing and mixing operation it is possible to run a total of 24 separate

tracks with a single feature. The four units in the projection room can be interlocked with a bank of 20 soundheads located in the downstairs lab, with the technician at the mixer panel operating the entire assembly by remote control.

The control panels in the projection room have a combined maximum voltage on the many circuits of only 17 volts, thus permitting emergency maintenance work without the danger of high voltage. With the selector switch, located top left on the panel, any unit can be operated from any of four panels, or all four units can be interlocked and operated from only one panel.

In addition to projector and light controls, the panel houses the multistation intercom for the entire building. Power for the projection room is distributed from a floating panel mounting 120 relays and associated circuit components. There are no fuses in the projection room to contend with since all circuits are on breakers, and every circuit has a pilot light.

An adjustable rack accommodating a loop of 100 feet of film for continuous run during recording and sound dubbing is also part of the RCA lab projection room equipment. Marshall Moody, Bert's son and frequent co-worker, has improved this rack by designing and building what he calls his Ouigi (Wee-Gee) board. This unusual "Gismo" mounts in the lower magazine and accommodates loops up to 500 feet in length. Marshall gave me a rundown on some of his experiences as a projectionist in TV stations. but we'll have to hold up on that for the present and cover it in a later column. Space limitations, you know.

## PICTURES AND COLOR TV

(*Continued from page* 14)

ticules then images through the base and onto the emulsion only that portion of the scene which has been imaged upon it. The entire picture, then, consists of a series of minute, juxtapositioned dots of varying density, just as in the case of a newspaper or a magazine illustration. Since the dots are too small to be resolved by the eye, they are not seen as individual dots, but rather as a smooth blend of densities.

To produce color with lenticular film, each of the minute lenticules must be caused to image a dot, one third of which represents each of the three primary colors. In other words, one third of each dot must represent red densities, one third must represent green densities and one third must represent blue densities. This is achieved by using a special filter before the camera lens, a filter which consists of three side-by-side bands, one band being red, one being green and one being blue.

### *Technical Problems*

If this film is projected through a similar filter the original scene can be reproduced in color. As was the case with the other single-strip additive system just described, there are technical problems associated with the lenticular system which have prevented its successful commercialization for theatre use. As before, however, it is likely that these problems may be less severe for television, because the picture is smaller.

The foregoing discussion assumes that one photographs a color kinescope image and that a tricolor filter is used over the camera lens to separate the color information as it is recorded on the lenticular film. It is also possible to effect the separation by geometric means. In this instance, the red, the green and blue aspects of the television signal are presented on three black-and-white monitor tubes. By means of a special optical system and appropriate masks, the three images are recorded in proper juxtaposition behind the lenticules without the aid of a tricolor filter. Thus, the entire operation can be carried out without the necessity of employing color phosphors or filters.

## CAUSES OF FILM DAMAGE

( *Continued from page* 12)

ently, is to work out some method which does not require film to be placed in contact with surfaces which may mar its finish or introduce dirt.

In the matter of print sticking, here we go again on our cry of the sin of obsolescence. No theatre should be equipped with a projector which does not provide for film gate tension adjustment. Let us hasten to add, however, that adjustable tension carries responsibility.

Responsibility lies with the projectionist to maintain only enough ten-

sion to provide a steady picture. Substantial observation by the writer in both military and commercial theatres leads to the conclusion that almost all print sticking is the result of excessive tension.

### *Excess Tension Causes*

Two factors lead to excessive tension: the first is certain thin newsreel stocks or prints which may be oily, require more tension. But once this special condition is past, the tension must be lowered to the minimum point for standard print projection. A second condition which may require excessive tension on *all* prints is pronounced hooking of the teeth of the intermittent sprocket. Early wear of intermittent sprocket teeth is the result of heavy tension, but once the rapidly progressive wear begins, heavier and heavier tension will be required to maintain steady images.

The question is asked: How long a period of service may be expected from the intermittent sprocket? A fair answer might be that after 4000 hours of actual use, a sprocket has served its best days.

The writer would suggest a check that is more reliable in the service efficiency. In this test, if normal film requires increasing amounts of tension, the sprocket is probably due for retirement. The intermittent movement itself will require rebuilding for each two sprocket surfaces which are worn out. Some projectionists and repair shops reverse intermittent sprockets in order to use both tooth sides. But let it be borne in mind that picture steadiness should never be accomplished at the cost of print damage.

For complete and reliable information as to film damage, the reader is referred to Robert A. Mitchell's "Manual of Practical Projection." A partial bibliography of recent articles in IP is below, and of course a broader coverage is listed in the cumulative index published each year in the January issue of IP.

### Partial Bibliography


Film Damage on the Increase, *Henry B. Sellwood,* January 1955, p. 14

Prevention of Damage to Prints, *Robert A. Mitchell,* June 1955, p. 7; July 1955, p. 9; August 1955, p. 15

That Hardy Perennial: Damaged Film, *James Morris,* February 1954, p. 9

That Ole Crank Twister on Scratchin', *Frank MacDonald,* March 1957, p. 36

Watch Out for Film Scratches, *Letters to the Editor,* March 1956, p. 19


## FILM STANDARDS

(*Continued from page 9*)

to motion-picture sound. The dynamic ranges of variable-area and modern variable-density "noiseless" recording, 60 and 50 db, respectively, is more than great enough for motion pictures even though the full dynamic range of a "live" symphony orchestra is about 70 db.

Under the most favorable conditions, CinemaScope magnetic sound attains 60 db, but 30 db is a fair average when the reproducing equipment is below par. Wide-track magnetic originals, now used by many studios, vary from 50 to 70 db in dynamic range, the latter figure obtaining when the recording equipment is in first-class condition.

A study of a number of 35-mm optical tracks on release prints strongly suggests that the full dynamic range of

optical recording is not being utilized. Nor is it necessary to utilize it.

A "whisper" to "thunder" range of 40 or 45 db seems quite satisfactory for run-of-the-mill movie recording; and both types of optical tracks can handle it. But considering the theoretical 16-mm TV range of 45-55 db, at least 50 db should be employed for the more dramatic pictures. But unless the "full capabilities" of optical sound be employed, it may be necessary, when the tracks are of the variable-density type, to make use of variable-area inserts for the "wide-range" scenes. This has actually been done when the recordist deliberately reduced the range of his variable-density tracks to eliminate distortion.

Too great a dynamic range, as in the optical version of the absorbing Warner Brothers' film "Giant," is a nuisance unless the theatre be very quiet. The variable-area track of "Giant" may have had a range in the neighborhood of 55 or 60 db, resulting in an apparent exaggeration of softness and loudness.

When dialogue alternates from a half-audible whisper to an ear-splitting shout, nerves fray — particularly the projectionist's. Dynamic range, however wide for a more natural reproduction of music and sound effects, should be restricted for dialogue passages. Projectionists have a tendency to "ride the gain" for a more uniform dialogue level, and thus may sometimes work at cross purposes with the intention of the director. Directors should bear in mind that there is always a certain amount of noise in motion-picture theatres.

### *Adjust During Dialogue*

With properly recorded soundtracks, the projectionist should adjust the volume control for proper sound level *during dialogue sequences.* Music and sound effects will then come in at levels which are correct even though they may momentarily *seem* to be too loud. (They were *intended* to be loud!) It should also be kept in mind that title music is normally about 6 db louder than average dialogue—quite the reverse of the radio-station practice of faint music and blaring commercials.

The optical tracks on magoptical prints have about half the average level of a standard track, hence the necessity of advancing the volume control 6 or 7 db when reproducing the optical tracks on magoptical prints.

As for the CinemaScope magnetic tracks—well, they are exactly the same as those on "straight-magnetic" prints, and subject to the same vagaries of volume level. Random variations amounting to 5 or 6 db are common in these magnetic tracks. They are caused by variations in the thickness of the striping, differences in chemical composition, and other factors of an obscure nature. Stray magnetic influences may cause additional variations in signal strength, and the net result may demand frequent adjustments of the volume control. The stereophonic effect is disturbed when the several tracks vary widely in output.

It is interesting to realize that the optical soundtrack is the only truly "passive" medium in commercial sound reproduction. By this we mean that it acts upon a source of energy (the scanning beam), modulating it, without itself being affected. The disk record is actually a spiral "cam" which mechanically imparts minute irregularities in the spiral groove to the needle of the reproducer. The energy which makes the needle vibrate is actually the turntable motor.

The magnetic soundtrack must physically rub across the pole pieces with their scanning gaps in order to generate minute currents in the electromagnets. Here, also, the energy generated is derived from the drive motor *via* the "record." And just as a disk record eventually wears out by repeatedly "driving" the pickup needle, a magnetic track may wear out through "magnetic friction."

Optical sound requires no mechanical pickup or translation of the recorded signal from the track. The scanning beam, being a mere slit of feeble light, does not wear it out. An optical track which has been played a thousand times will sound like new

if protected from scratches and dirt. Disks and magnetic tracks are relatively impermanent. A magnetic video tape of the kind used in TV loses image quality after only a dozen playings. Sound tapes and CinemaScope magnetic tracks can be played many hundreds of times; but each playing produces just a little loss of signal strength and adds just a little noise. Optical tracks are thus the most scientific of all sound records!

### Sound Slipping?

Complaints anent poor sound quality in theatrical films are becoming more numerous, thanks to slipshod work and CinemaScope magnetic recording. The magoptical print has dealt still another blow to good theatre sound. The writer was recently surprised, and somewhat disconcerted, to find certain purely amateur film recordings far superior in sound quality to Hollywood's expensive efforts.

"My impression is that sound has not been so good recently as it was some few years ago," write an exhibitor in *Kinematograph Weekly*. "I find the trouble so often in various cinemas. Producers are not giving enough attention to the matter. Some inquiry should be made to find out what is at fault." Could it be that *Kinematograph's* correspondent does not read IP?

But what of magnetic film for recording in the studios? It has its faults, but there is much to recommend this comparatively modern medium. Tape is economical, requires no processing, permits immediate playbacks, and has so low a ground-noise level that a large number of original records may be "mixed" to produce a composite record. The principal disadvantages are equipment upkeep, invisibility of the record (annoying to the film cutter), possible accidental loss or contamination of the record, and liability to distortion when the recording and reproducing equipment is not up to par. The last-named factor is far more prevalent than many people suspect, and imparts to magnetic sound a harsh, "metallic" quality.

The advantages of good magnetic recording in the studios accrue to the theatre field *via* carefully made release-print optical tracks. Paramount, for example, records in magnetic and releases in optical. Even CinemaScope magnetic tracks are usually re-recordings from wider and better single-channel magnetic originals, the pseudo-stereophonic effect having been artificially added during the re-recording process by the familiar pan-pot method.

Pan-pot switching is similarly used for "cueing" Perspecta pseudo-stereophonic optical tracks. Genuine stereophonic recording on the set is not employed in commercial motion-picture production. *We have no real stereophonic sound for motion pictures.*

Several independent studios, however, still employ the old standard optical recording for production because of the ease of editing optical tracks. When these tracks are well made, there is probably no perceptible difference in sound quality between the two methods; and when push-pull optical originals are employed, sound quality may even be superior to that from run-of-the-mill magnetic originals.

### Push-Pull Tracks

It is certainly true that optical tracks are more dependable and uniform in quality; and a few recording technicians with experience in all processes insist that push-pull optical tracks provide the best motion-picture sound.

Had it not been for the introduction of CinemaScope magnetic tracks in 1953, push-pull optical tracks might be used in the theatres. Push-pull tracks have the advantage of an extremely low noise level even transverse splice lines are silenced by them. But instead of going up, as might be expected, sound quality in theatre reproduction has definitely gone down in recent years. The charts, tables, and formulas of the experts mean little or nothing as far as the moviegoing public is concerned. The sound is either good or bad; and people can tell the difference between good and bad sound even if they cannot perceive any difference between optical sound and the very best magnetic sound.*

Projectionists are mainly concerned with the nature of the sound record on the release print, not with that of the original recordings. Sound-on-disk may be used by the stuidos, and the projectionist need not particularly care. What he *does* care about is the standardization of the release-print soundtrack and the quality of the reproduction.

CinemaScope magnetic tracks have been standardized, but they are nonstandard in relation to the more frequently used optical track. Moreover, the non-standard type of film perforation introduced by CinemaScope will remain non-standard until it is universally adopted by producers for the majority of their releases. We do not foresee this eventuality.

* The audience attending the premiere performance of Paramount's "White Christmas" in the fall of 1954 could perceive no difference between CinemaScope magnetic stereophonic sound and standard 1-track optical sound reproduced stereophonically by the Perspecta integrator.

[TO BE CONCLUDED]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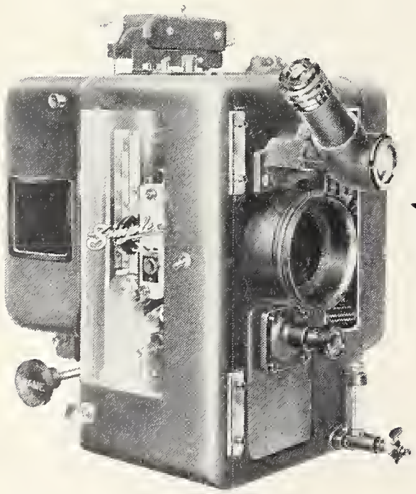

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JULY 1957

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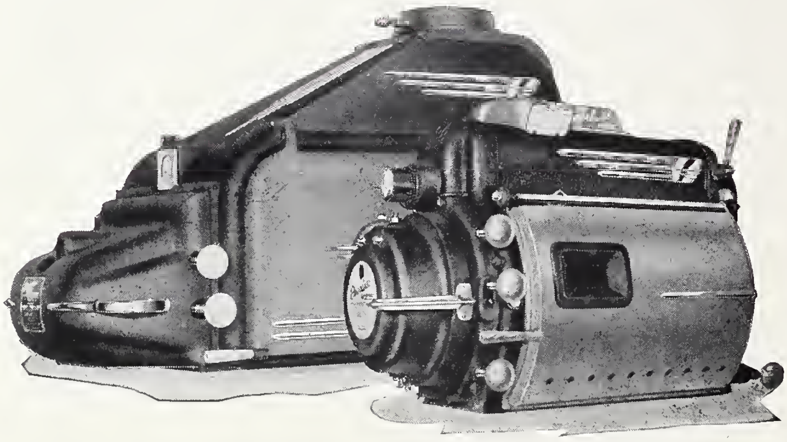

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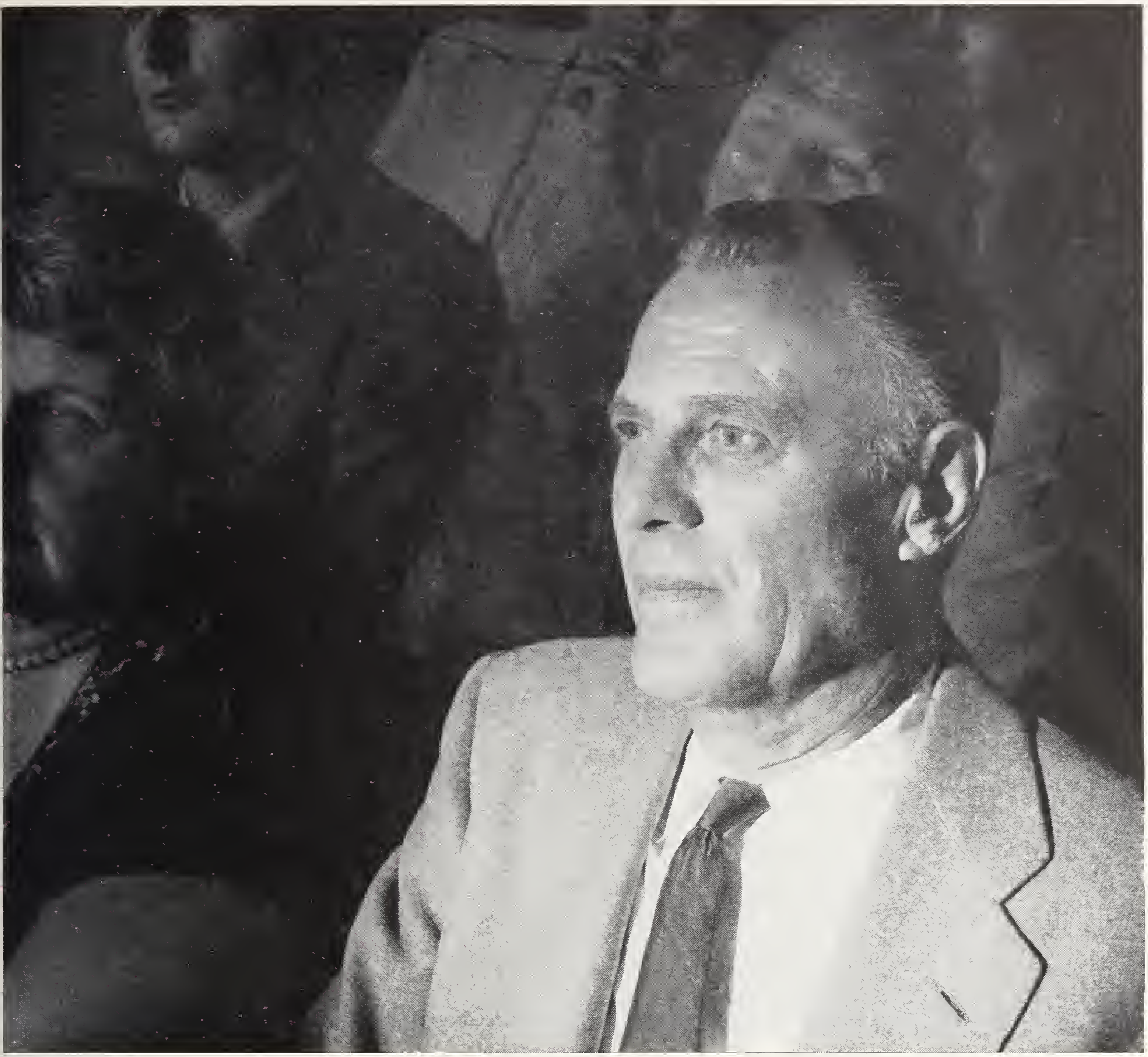

# International PROJECTIONIST

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Volume 32 JULY 1957 Number 7

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## Monthly Chat

### Background, Foreground, and No Ground

WE CAN BEST begin by quoting part of a letter we received a while back from a Canadian brother, Al Mulcahy, IA Local 348, out in Kamloops, B.C. He writes:

". . . there are many discussions by projectionists regarding the ability to focus pictures on the screen, sometimes with remarks to the effect that the projection lens can tell the difference between the foreground and the background in the projected image.

"Many projectionists believe that you can sometimes focus *either* the foreground, *or* the background, but not always both. What they do not realize (and some won't agree to) is that focus in the theatre is a function of conjugate foci, and the lens cannot care whether the image on the film depicts foreground or background of the scene. . .

". . . It has been heard from some that at times VistaVision is not very good, for the reasons mentioned above, that is: 'I can focus the actress sharp, but look at the background . . . way out of focus.'

"If the actor is shown head and shoulders in sharp focus, and the background is fuzzy, the cameraman was either using selective focus or else was using process rear projection."

Thank you, Al. We have never run into that particular complaint in this bailiwick, but we have heard of it from other sources. Time and time again IP has reiterated: "If it isn't on the film, we can't show it." Let's change that around: "If it *is* on the film, you can show it." (Providing of course, that you have decent equipment—the major factor.)

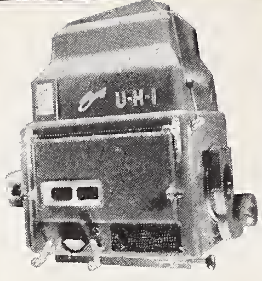
#### *No Better Than on Film*

Cameramen, if they can help it, are going to get all the information of a shot in focus. Recently, such processes as Technirama have made it possible to get very good definition with a coupled close-up-and-background shot. And the distance from your projection lens to the film is going to be the same whether you are projecting a vista shot of Grand Canyon or a closeup of Elvis Presley's crockery. No matter how large they make the negative to reduce the grain in the positive, all it can do is improve the resolution in the positive. It isn't going to bring into focus anything that did not originally lie within the depth of field of the camera.

Conversely, if, by some odd chance, someone behind the taking-camera bollixes up the focus, there isn't anything the poor projectionist can do about it, let the audience whistle as it may. Nothing can ever be sharper on the screen than it is on the film.

In some cases where the foreground is sharp and the background fuzzy, it may be that—say in the case of a VV print—that the fore image is shot in VV, and the rear information from a "stock" taken previously on non-VV film. This is usually noticeable in the difference in grain.

But never believe that you have a choice of focusing either the background or the foreground. Can't be done. It's on the film, and it's on there to stay.




STRONG U-H-I
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For drive-in matte screens up to 120 feet wide and high gain screens up to 140 feet wide.
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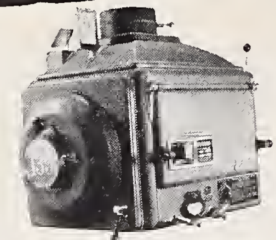
Overall optical speed f 1.5 with f 1.5/1.6 projection lenses and projection cleared for f 1.5.



STRONG SUPER "135"
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For drive-in matte screens up to 100 feet wide and high gain screens up to 120 feet wide.
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STRONG UTILITY 1 KW
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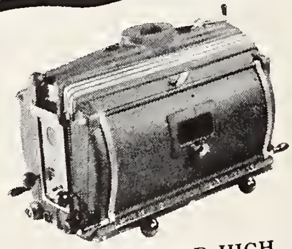

STRONG JUNIOR HIGH
(40 Ampere 28-Volt High Intensity Arc for 35 mm Projection)
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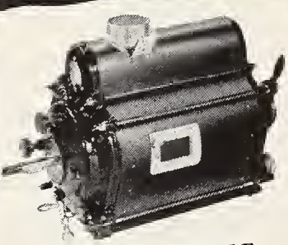
Burns a 6 mm x 9" negative and a 7 mm x 12" copper coated positive. 10¼" dia. f 2.3 reflector.



STRONG PORTABLE
(D.C. Low Intensity Arc for 35 mm Projection)
For screens up to 12 feet wide. 6⅝" dia. f 3 reflector.
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(16 mm Projection Arc)
This 30 ampere high intensity arc projects 2600 lumens of snow white light, without shutter, the maximum amount of light that can be projected without buckling the film.
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INTERNATIONAL PROJECTIONIST

Volume 32 JULY 1957 NUMBER 7

**For a wider roadshow coverage, "Around the World in 80 Days" is also being shown in 35-mm, necessitating new developments. Since this announcement, there has been a good deal of speculation throughout the industry concerning the technical story. In the interest of getting the straight facts, IP has consulted the Todd Co. technical supervisor for the following information.**

# "Around the World" in 35-mm

By CARL E. WARNER

Technical Supervisor, Michael Todd Company, Inc.

"AROUND THE WORLD IN 80 DAYS," Mike Todd's production of Jules Verne's travel romance, is about to do some more extensive traveling. Realizing that increasing playdates of the show would require diversion from the standard policy of exclusive 70-mm roadshowing, "80 Days" has been prepared to convert to 35-mm from its very inception. Expansion of bookings both here and abroad has been a primary reason for the development of a 35-mm version; the excellent results obtained from premier 35-mm showings has bolstered that decision. However, these 35-mm releases will not divert from our standard road-show policy: reserved-seat, two-a day.

Unlike the shooting of "Oklahoma!" where a simultaneous 35-mm CinemaScope print was made, both the 35- and 70-mm versions were made in the Todd-AO process on 65-mm camera film. Each scene in the motion picture was photographed twice by the same camera: first for the 30-frame/sec print, then for the standard 24-frame/sec. The identifying cameraslate at the beginning of each scene chalked up the information as to which speed was being used. A gear-reduction motor in the camera allows the operator to change speed at will.

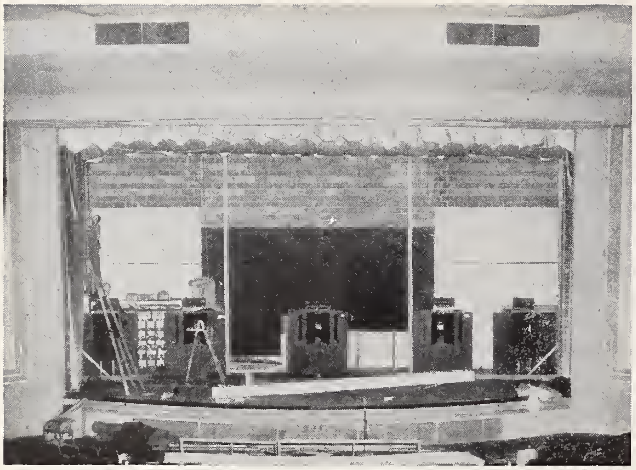
> **Todd-AO in 35- and 70-mm**
>
> "Around the World in 80 Days" will be released on 35-mm stock for expanded projection as well as on 70-mm stock for projection via the Todd-AO system. This procedure, already in use for "Around the World" showings abroad, will materially increase the number of theatres in which the picture can be seen.
>
> A specially built optical unit consisting of a prime lens and anamorphic lens in combination is to be used. Screen aspect ratio will be 2/1. Houses projecting the 35-mm release will be required to follow the two-a-day roadshow policy; to provide four-track, Cinama-Scope, stereophonic, magnetic sound, and to project to a wide, curved screen similar to those used in other Todd installations.

Todd-AO is projected in a 2/1 ratio, as opposed to the CinemaScope 2.35/1, and the 35-mm version will be projected at 2/1. Concerning the ratio problem, the Todd Co. has been obtaining excellent results from the 35-mm projection lens designed exclusively for the process by Panavision of California. This combination comprises a prime lens and a cylindrical anamorphic lens in one unit, pre-fixed at the factory to insure an exact 2/1 aspect ratio.

### *35-mm Results Excellent*

Results of the first 35-mm showing in this country at the Esquire Theatre in St. Louis have confirmed that these releases will convert readily to those houses not equipped for 70-mm, allowing utilization of existing facilities such as magnetic stereophonic sound reproduction, and the special wide, curved screen.

Considering the fact that each house desiring to show "80 Days" in 35-mm will present its own special problems,



Interior of the Esquire Theatre in St. Louis during installation work to accommodate the 35-mm version of Todd AO's "Around the World in 80 Days." Visible are the five Altec behind-the-screen speakers. System also utilizes 16 surround speakers.

the initial domestic installation in St. Louis cannot be specifically termed "typical," but it provides an illustrative example of how one house adapted to conversion requirements. For the best presentation (and the resultant best box-office), these requirements must be met. These are not excessive, nor in most cases are they difficult to install.

The Todd sound set-up calls for splitting the surround speakers. Since most houses do not have this type of installation, it becomes necessary for our engineers to construct proper installations. Aside from the five Altec behind-the-screen speakers, the Esquire theatre employs sixteen surrounds. There is provision on the fourth magnetic track for controlling the surround speakers which requires the use of a Perspecta integrator.

For maximum light efficiency, a high gain white screen over 40 feet in width is also recommended. Projection standards should consist of at least 14,000 lumens of light overall, propelled by a minimum of 115 amperes. (Considering that specification, it might be interesting to note that, for a time, the initial showing of "80 Days" at the Rivoli Theatre in New York City was being projected at 262 amperes.) The Esquire Theatre utilizes two Simplex XL projectors with water-cooled curved gates and Ashcraft Super Cinex lamps. The throw is 120 feet.

### *25 Feet from Screen*

The St. Louis theatre now seats 980, removal of some seating being necessary since a minimum of 25 feet from the center of the screen to the viewer is required.

Whatever equipment is used, we nevertheless consider only the best possible projection, screen brightness and definition.

The use of 35-mm prints for "80 Days" is expected to increase roadshows to at least 70 openings, and while very good results are expected from those releases, it is contemplated that the majority of playdates will still be in the 70-mm.

At present some fourteen more openings are scheduled soon in this country, the most recent being at the Virginia Theatre in Atlantic City, and at Loew's in Cleveland—both in 70-mm—and at this writing the following have been designated:

35-mm openings now scheduled will be in Fort Wayne, Indiana; Asbury Park, New Jersey; Salt Lake City, Utah; New Haven and Hartford, Connecticut; Albany, New York; and Tampa, Florida.

70-mm versions are to be installed in Jacksonville, Florida; Columbus, Ohio; San Diego, California; Beaumont, Texas; Providence, Rhode Island; and in two others planned for Rochester, New York, and Youngstown, Ohio, particular versions have not been decided upon as yet.

At present, 35-mm prints are being shown overseas in London, Paris, and Caracas. Others are planned for Sydney, Tokyo, Singapore, Paraguay, Lima, Johannesburg, Munich, Brussels, Zurich, Rome, Stockholm, Teheran, Montevideo, Bombay, Manila, Oslo, and other European and Asiatic cities.

"Around the World" playdates will be just that—global.

## "Cineoptic"—New Dimensional Convex Screen

American Commercial Exchange of Charlotte, North Carolina, has come up with what it hopes to be the answer to dimensional viewing—a convex screen that curves both vertically and horizontally. According to the inventor, the screen system (commercial name: "Cineoptic") is based on a formula propounded by Professor Hemholtz in 1887 in Berlin. It is based on the concept that the human eye sees a curve as a straight line and a straight line as a curve, thus giving the conception of dimension.

Thirty-nine years in development, the screen depicts the design of the human eye, with semi-oval projections over its entire surface. Walter H. Shapiro, president of American Commercial Exchange, points out that the system requires no additional cameras or projectors, the screen being dimensional itself. Present widescreen processes are claimed to be complimentary to "Cineoptic," with improved feeling of depth and dimension. Also touted for the new screen is that an audience seated well to the side of the screen will receive the image without the usual distortion.

Designed for both indoor and outdoor theatres, the convex screen also features polarized light, caused by uneven reflection of light waves, thus tending to give even distribution over the entire surface. The breaking up of light waves is calculated to concentrate a greater percentage of projection light on the surface of the screen, creating a brighter image and enhancing color photography.

Primary tests have been claimed to reveal no hot spots on the screen, even when using high frequency materials such as fiberglass. beaded glass, vinyl plastics, mirror screens, etc.

Basic principle of the convex screen is that since the eye (or the camera lens) sees in horizontal convex curves—thus giving the illusion of three dimensions—a projected image should be received in the same manner. Thus, the horizontal convex curves provide three-dimensional effect, and the vertical convex curve of the screen is intended to eliminate distortion.

American Commercial Exchange, which holds the patent rights, wishes to extend full cooperation to any and all producing companies that want to test the system, as well as to TV picture tube manufacturers. It is claimed that construction is no more difficult nor costly than any existing screen.

### BIS Closes Service

For reasons of economy, British Information Services are ending distribution of theatrical and non-theatrical films here. Films cleared for TV are still available, but no applications for rental or sale of 16-mm prints are being accepted. The service was instituted in 1940 to acquaint the American public with the British war effort.

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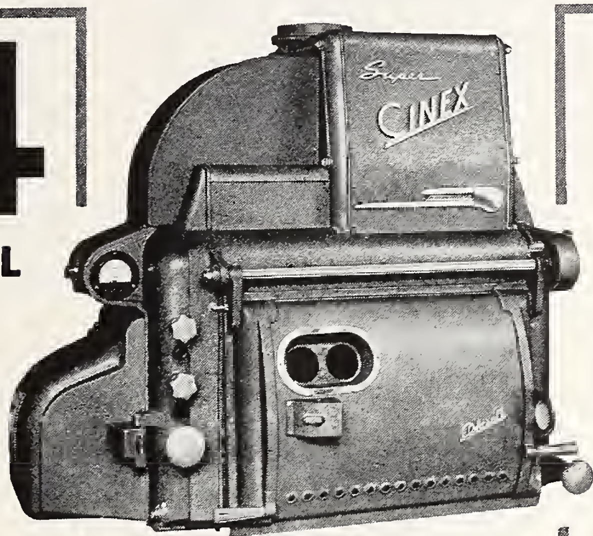


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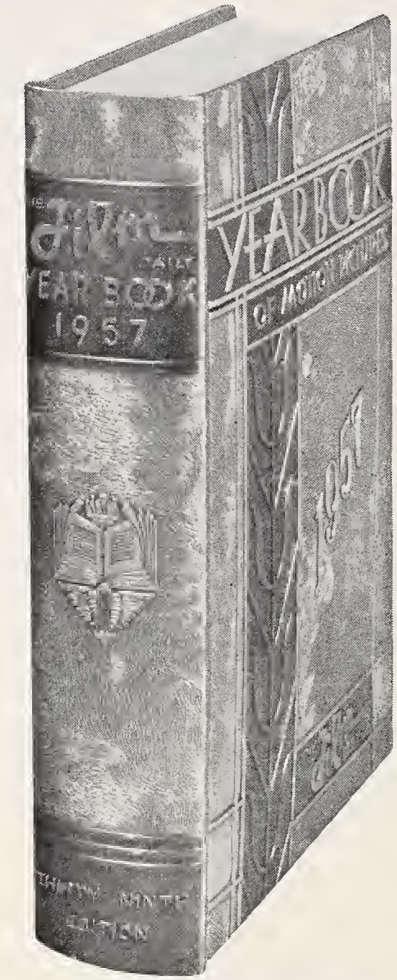


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# Film Standards for Picture and Sound

By ROBERT A. MITCHELL

**A review of the many types and sizes of release print issued at the present time, with some argument for a return to the standard 35-mm release-print format.**

WHEN SOUND PICTURES were commercially introduced in 1928, two distinctly different systems of sound reproduction entered the motion-picture theatre. One was termed "sound-on-film," and the other "sound-on-disk." The latter was used in the first commercially successful attempts to bring both music and spoken dialogue to the screen.

Disregarding technically successful early European efforts in the audible cinema, the commercial American sound picture began its history on the sultry New York evening of August 6, 1926 when Warner Brothers presented John Barrymore and Mary Astor in "Don Juan" with a stirring orchestral accompaniment—but no orchestra! Electrically recorded and amplified disk records were played on turntables mechanically interlocked with the projectors.

### Sound Arrives

This synchronized-record process, subsequently called "Vitaphone," was used a year later to reproduce the singing and speaking voice in Al Jolson's famous film "The Jazz Singer." So enthusiastic was the moviegoing public over the October 1927 showing of this "talking picture" that sound stages at once began to rise on Hollywood studio lots. And by 1928, the Vitaphone sound-on-disk process, the Fox Movietone and Western Electric variable-density sound-on-film processes, and the RCA Photophone variable-area sound-on-film process banished the silent screen forever.

As far as sound quality went, the earliest sound-on-disk was somewhat better than early sound-on-film. But as the years went by, sound-on-film was improved to the point where the best optical tracks were far superior to the best plastic disks. One of the most noteworthy achievements was the use of optical and electrical biasing to render the soundtracks practically noiseless during periods of silence. The push-pull system was another great advance; and, although used in studios, was forestalled by the magnetic method from gaining wide use in the theatres where it could have done much to improve sound quality even beyond present-day levels.

Release prints underwent a series of simple modifications in 1928—1929 when the sound-on-film method became the most widely used process. Film travel was increased from 16 to 24 frames per second in the interest of frequency range; and a strip 0.1 inch wide was appropriated from the left-hand side of the picture area to accommodate the soundtrack. Perforation dimensions were left untouched.

Not until 1931 was a radically different camera aperture adopted; and prior to that year many projectors employed a standard silent aperture (0.91" x 0.68") with a sliding edge to mask the soundtrack from the screen when sound-on-film subjects were shown.

The demise of sound-on-disk induced the industry to restore the 4:3 proportionality of the screen for all showings by means of "proportional" camera and projector apertures, the latter measuring 0.800" x 0.600" and soon afterward increased in width to 0.825 inch to give the 4:3 proportionality when the picture is projected at a small angle.

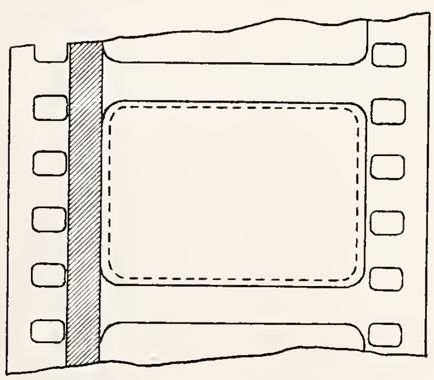


FIG. 1. 35-mm normal soundfilm. Standard perforations (0.110" x 0.078"); running speed 90 ft. per min., 24 frames per sec. Camera aperture, 0.87" x 0.64"; projector aperture, 0.825" x 0.600" (aspect ratio 1.375/1). Optical soundtrack, 0.1" wide (scanned width, 0.084")

The standard proportional camera aperture, often called the Academy aperture, measures 0.868" x 0.610", and still remains the standard for non-anamorphic 35-mm soundfilm photography. Its use, reaffirmed by British Standard 2784, results in a frameline appreciably thicker than that on either silent or CinemaScope prints (Fig. 1).

### Off-Standard Films

Off-standard films for special presentations have come and gone ever since the invention of movies; but the standard optical-sound release print having the Academy frame remained substantially unchanged from 1931 to 1953, when CinemaScope presented the projectionist with a smaller size of sprocket perforation, magnetic soundtracks, and a new size of frame in which scenes were anamorphically compressed for the wider-than-normal screen.

The wide screen has now almost completely displaced the 4:3 screen proportionality employed since the beginning of commercial movies. Wide-screen projection of non-anamorphic films requires severe "cropping" of the picture, a practice at first condemned by many technologists, but now accepted as standard operational procedure. But until cameramen conformed picture "composition" to the widescreen format, actors frequently roamed the vast new screens in a more or less headless condition, and the superposed subtitles on foreign films were often hidden from view.

When theatres movies became bigger, if not always better, they also became dimmer and fuzzier. The emulsion grain of the camera negative was blamed; but faulty color registration, unsharp photography, and slipshod printing of masters and internegatives added to the blurriness of the overblown images. (Bad printing of release positives was a flaw recognized even before the advent of the wide screen.) But as these factors were improved, one producing com-

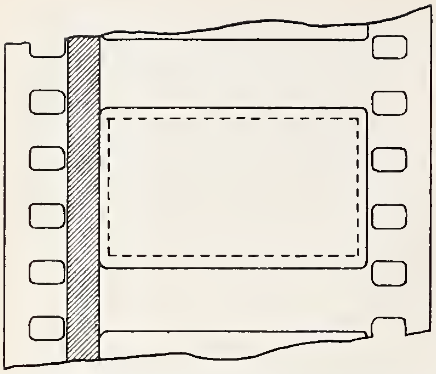


FIG. 2. 35-mm "vertical" VistaVision print. Standard perforations. Camera (printer) aperture, 0.87" x 0.55"; projector aperture, 0.825" x 0.497" for aspect ratio 1.66/1, 0.825" x 0.471" for 1.75/1, 0.825" x 0.446" for 1.85/1, and 0.825" x 0.412" for 2/1. Optical soundtrack cued for Perspecta stereophonic sound.

pany, Paramount, went a step farther by using a large-frame negative to reduce the effect of emulsion graininess. Called VistaVision, the Paramount process utilizes a regular 35-mm film running horizontally through the camera with 8-hole frame shifts.

### *VistaVision Releases*

VistaVision negative frames have an aspect ratio of 1.48/1 when the full area of the film is utilized, or 1.7/1 when 0.1 inch is masked off the top of the picture to accommodate the soundtrack in contact prints which, of course, must run horizontally through projectors of special construction.

Standard 35-mm release prints are made from VistaVision negatives by a special process of reduction printing. And just as the picture, itself, is reduced in size, so also are the tiny clumps of silver grains which compose the image on the negative.

It was the original intention of Paramount to utilize the conventional 1.33/1 aspect ratio on "vertical VistaVision" release prints for unobstructed projection in the normal 1.375/1 projector aspect ratio when desired. What actually developed, however, was a cropped *printed* frame on the film! A frame of this type *on the print* has been very severely condemned abroad where there are more 1.375/1 theatres than in North America.

Fig. 2 illustrates the usual type of "vertical VistaVision" release print in circulation at the present time. It does not have a standard frame, and hence cannot be used for standard projection (aspect ratio 1.375/1) without showing the framelines. The VistaVision release print can accommodate the 1.66/1 projector aperture, however, as well as the 1.85/1 aperture commonly used in the United States and the 1.75/1 aperture preferred abroad.

### *Cropped Frame*

The full height of the horizontal VistaVision negative frame is utilized in the cropped frame reduction-printed on the vertical release positive. To give a standard frame on the release print, additional small areas along the sides of the negative frame must be lopped off, but the loss of pictorial detail resulting therefrom is quite insignificant.

Our conclusion is that *cropped* VistaVision printing has only a nuisance value the industry could well do without. Whatever aspect ratio is employed for projection, all non-anamorphic prints should allow full latitude as to the choice of ratio. Theatres using the standard 1.375/1 ratio should be allowed to project at this ratio without the appearance of frameline areas along the top and bottom of the screen.

Horizontal VistaVision prints (Fig. 3) are as off-standard as the Corbett-Fitzsimmons fight films of 1897. They require special projectors; and unlike Todd-AO *combination* 70 — 35-mm projectors, horizontal VistaVision mechanisms *cannot* be used for standard showings. And what is the use to the general field of *any* projector unable to play the releases of *all* producers?

Horizontal VistaVision, which made its debut with the Radio City Music Hall showing of Paramount's "White Christmas" in October 1954 at an aspect ratio of 1.96/1 on a 60-foot screen, gives somewhat improved illumination and picture definition; but it cannot be said that the improvement over regular 35-mm projection was by any means striking. In fact, certain defects were noticed. Sidewise unsteadiness of the image was one of these—a common complaint when 35-mm film is pulled through 8-hole shifts by sprocket movements. This defect can be, and in fact was, remedied.

**If You Disagree . . .**

**. . . go ahead and let us know. Honest and thoughtful disputation is one of the factors that keeps any industry from becoming stagnant. Mr. Mitchell presents a documented dissertation for his point of view, but we do not expect everybody to agree with the argument. Particularly in the past few experimental years, sides have been taken on a wide variety of motion-picture developments—and this publication is always interested to hear from all sides.**

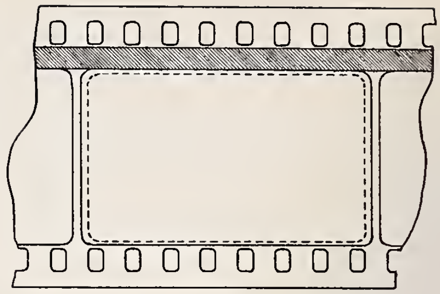


FIG. 3. 35-mm "horizontal" VistaVision print. Standard perforations. Regular camera aperture (not shown), 1.47" x 0.99"; camera aperture with soundtrack masked off, 1.47" x 0.87"; projector aperture 1.418" x 0.723" (aspect ratio 1.96/1). 24 frames per second. Normal optical track playing at 180 ft. per min.

### *Freedom from Buckle*

The great advantage of "horizontal" 35-mm large-frame film over "vertical" wide film for projection purposes resides in the relative freedom of the former from buckle and in-and-out flutter. Like VistaVision, the new Technirama process also uses 35-mm film running horizontally and shifted eight sprocket holes 24 times each second.

The use of curved film gates, desirable but not an absolute requirement in horizontal VistaVision projection, are mandatory as a buckle-reducing expedient in the projection of films wider than 35 millimeters. In fact, curved gates in standard 35-mm projectors has made modern standard-film projection equal to, if not superior, to any other type of motion-picture system. Edison's choice of 35 millimeters for the width of motion-picture film seems almost inspired.

VistaVision, both in the form of "horizontal" contact prints and "vertical" reduction prints of standard-release format, is capable of considerably better resolution than an anamorphic process (CinemaScope, SuperScope) is able to attain.

The anamorphic process of image-compression in photography and expansion in projection is even older

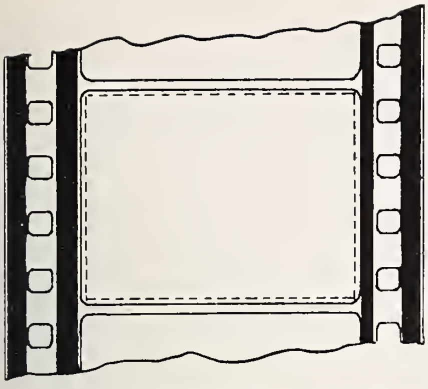


FIG. 4. 35-mm magnetic-track CinemaScope print. Undersized perforations (0.078" x 0.073"). Camera aperture, 0.94" x 0.74", projector aperture, 0.910" x 0.715" (aspect ratio 2.55/1 at anamorphic factor 2). Three 0.063" magnetic tracks and one 0.041" sound-effects magnetic track.

than the movies. It gained commercial acceptance only as late as 1953 when 20th Century-Fox replied to the ineptitudes of 2-strip 3-D with CinemaScope, a process which employs a slightly off-standard frame and an anamorphic factor of two (which means that the horizontal dimension of the film image is magnified twice as much as the vertical dimension on the screen). CinemaScope, SuperScope and all their sisters are strictly "2-D" —as "flat" as conventional movies. True 3-D stereoscopy absolutely requires binocular (2-eye) "analysis."

### Four-Track Sound

As originally designed, CinemaScope employed a small-perforation 35-mm print which carried four narrow magnetic tracks. The three 0.063-inch stripes supplied the left, center, and right stereophonic channels, while the fourth track, only 0.041 inch in width, contained "surround-speaker" sound effects and a 10,000-cycle control tone which served to operate the fourth-track amplifier, suppressing its output during moments of no sound signal. This system is in use on present CinemaScope prints in spite of the fact that weak tracks and worn pickup clusters often fail to reproduce the 10,000-cycle control. Sound quality from the fourth track is less than satisfactory, and has a limited frequency range.

Fig. 4 illustrates the configuration of the "regular" CinemaScope print, now all but discontinued. An alternative optical-track CinemaScope print was issued to theatres not having magnetic sound equipment—the great majority. The optical print had standard perforations (Fig. 5).

In order to eliminate the need for two different types of prints, several producers have now combined the magnetic and optical versions of their CinemaScope pictures into the "magoptical" hybrid print (Fig. 6) discussed last month from the standpoint of physical durability and sound quality. The magoptical print is somewhat inferior to standard optical release prints in both particulars, and bodes no good for either projectionists or exhibitors.

The aspect ratios at which CinemaScope is projected depends upon the type of print used and the width-height relativity of the theatre screen. While all three forms of CinemaScope print may be shown at an aspect ratio of 2/1, the *maximum* ratios are 2.55/1 for the old magnetic print and 2.35/1 for both the optical and magoptical prints.

### Merits Debated

The merits of the CinemaScope process are debated. It certainly succeeds in providing a widescreen image having a large aspect ratio with a minimum loss of light. (The anamorphic attachment absorbs nearly as much light as is gained by the slightly larger-than-standard CinemaScope aperture). Image quality, however, is spotty—sometimes good, but more often very bad, especially when the imbibition dye-transfer process is used for making the color prints.

Disregarding the effects of mismatched or inferior projection anamorphots, the trouble with CinemaScope lies in the small field provided by cylindrical and prismatic lenses. The central region of the projected picture may be clear, but the side areas, lying outside the field of sharp imagery, are often blurred. Unsharp side areas in photography contribute to this intolerable defect.

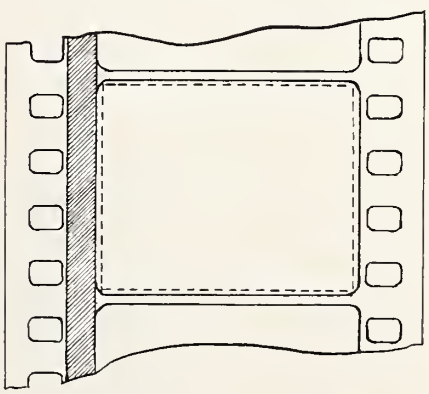


FIG. 5. 35-mm optical-track CinemaScope print. Standard perforations (0.110" x 0.078"). Camera aperture, 0.87" x 0.74"; projector aperture, 0.839" x 0.715" (aspect ratio 2.35/1 at anamorphic factor 2). Optical soundtrack 0.1" wide.

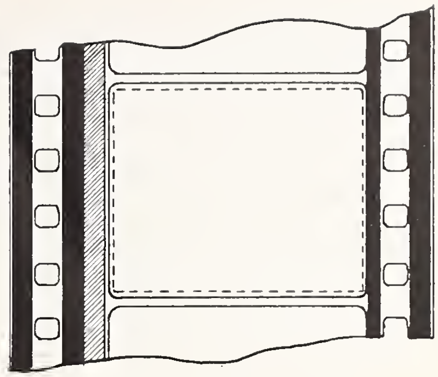


FIG. 6. 35-mm magoptical, or combination magnetic-optical CinemaScope print. Perforations same as on magnetic print, camera and projector apertures same as for optical CinemaScope print, and magnetic soundtracks same as on magnetic print. The optical track, however, is only 0.038" wide, with the full area being scanned—*45% of the scanned width of standard optical tracks!*

In addition, small errors in the amount of anamorphic expansion are common. The bad practice of using an anamorphic factor of somewhat less than two on the camera in a misguided attempt to counteract the image-elongating effects of steep projection angles results in gross distortion when projection angle is moderate. This distortion always results in fat-headed actors and pregnant-looking actresses, and resembles excessive horizontal sweep on a TV set.

### Spatial Distortions

The use of curved screens for CinemaScope (or any other single-projector system) combines with projection angle to create weird spatial distortions—curved horizons and bowed buildings—and has been strongly condemned by IP for many years. And yet the practice continues, 1953 curved screens never having been replaced by modern flat screens!

In an effort to improve the quality of 35-mm CinemaScope release prints, 20th Century-Fox has begun to utilize a 55-mm negative with reduction printing. There is a slight reduction of negative grain in the CinemaScope-55 process, but the old anamorphic limitations remain.

(*Continued on page* 30)

**"Night Passage," U-I production, is the initial picture in the Technicolor system that is being claimed on both sides of the Atlantic as achieving superior definition.**

# Filming the First Hollywood Technirama Production†

## By ARTHUR ROWAN

TECHNIRAMA is Technicolor Motion Picture Corporation's contribution to the ever-widening search for the ideal large-screen system of motion picture photography and exhibition. In the photographic process it involves the same eight-sprocket (double frame) picture area and horizontal film travel in the camera that earlier was adopted by Paramount studio in the development of VistaVision. But it goes a step further in that anamorphosis is employed in the optical system.

Focal distortion is practically eliminated by a technique that adds a squeeze (anamorphic) lens to the system that produces partial scene compression in the camera, with the remainder being effected in the printing process. The result is a picture of CinemaScope proportions but having greater sharpness, definition and depth and an absence of distortion.

William Daniels, ASC, who directed the photography of the first production to be made in the Technirama process by a Hollywood studio—"Night Passage," starring James Stewart and produced by Universal-International—claims many advantages are inherent in the system. "In the days when we shot nothing but the old '3 by 4' aspect ratio, cinematographers achieved a great deal of photographic perfection and established a number of standards," he points out. "Then, with the advent of wide-screen and large-screen systems, many of these advantages had to be sacrificed in favor of sheer screen size. The development of Technirama marks the first time since the development of 2 to 1 and 2.55 to 1 aspect ratios that we have been able to re-capture much of the fine quality we obtained photographically with the old '3 by 4' methods."

The trend of big-screen exhibition practice is toward an aspect ratio greater than 1.66 to 1, according to Daniels, who pointed out that Technirama retains and fully utilizes the large-area double-frame and obtains the desirable high aspect ratio by compressing the image horizontally 1.5 times in the camera. A further compression in the horizontal direction is made in the printing process so that the combined camera and printing compression amounts to 2 to 1. Standard "unsqueezed" 1.85 to 1 prints can also be made from the same Technirama negative. Technirama prints in the 2 to 1 format are compatible with CinemaScope and may be projected in the C-Scope format in either the 2.55 to 1 or 2.31 to 1 ratios.

### *Wider Lens Scope*

The Technirama lens for photography is an attachment or auxiliary lens, anamorphic in type, not the usual barrel lens but prismatic. It is designed to be used with the normal 50-mm, 75-mm and 100-mm lenses, and is so coupled with these lenses that it is focused simultaneously and in sync with them.

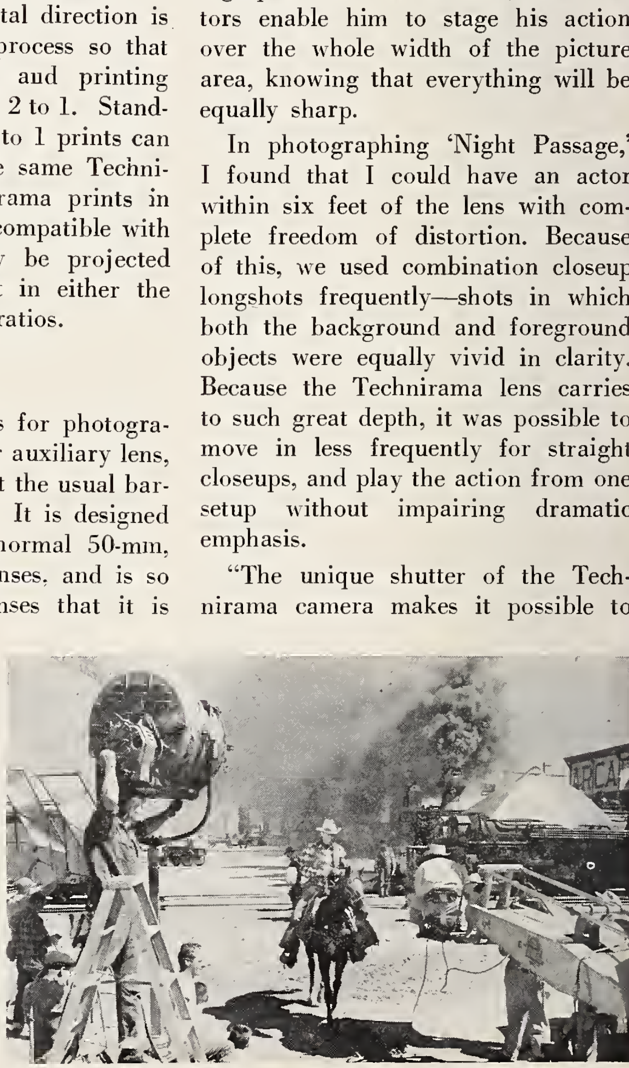
The scope of the Technirama lens is said to be greater than the lenses used in other wide-and large-screen systems. Technicolor engineers made the following comparison: With the camera, mounting a 50-mm lens, focused on a scene 100 feet distant, the picture area taken in with the Technirama lens is 105-ft. by 42-ft., compared with 93-ft. by 36-ft. for CinemaScope, 68-ft. by 37-ft. for VistaVision, and 42-ft. by 23-ft. for the old Movietone aspect ratio.

It is the fine calibration of Technirama lenses which enabled him to obtain consistent sharpness in the photography of "Night Passage," according to Daniels. "One can always depend upon the calibration marks on Technirama lenses and rely on the standard slide-rule depth of field tables established for these lenses," he said.

"The inherent sharpness, clarity and definition of Technirama offers opportunities both for director and cinematographer. For the director, these factors enable him to stage his action over the whole width of the picture area, knowing that everything will be equally sharp.

In photographing 'Night Passage,' I found that I could have an actor within six feet of the lens with complete freedom of distortion. Because of this, we used combination closeup longshots frequently—shots in which both the background and foreground objects were equally vivid in clarity. Because the Technirama lens carries to such great depth, it was possible to move in less frequently for straight closeups, and play the action from one setup without impairing dramatic emphasis.

"The unique shutter of the Technirama camera makes it possible to



Although James Stewart here is in a medium closeup, (Technirama camera cn boom), the pertinent details in the background were also included, due to the depth ability of the Technirama process.

† American Cinematographer, March 1957

produce pan shots without creating strobe effects. The same is true when making diagonal or lateral tracking shots. All these factors afford the cinematographer advantages for achieving more artistic photography. The system's great clarity and depth opens new opportunities in pictorial composition; the consistency of its lens system leaves nothing to chance and assures, from a purely photographic standpoint, an acceptable take every time."

Not only is Technirama a great step forward, photographically, Daniels said, but its development marks one of the great advances made by the Technicolor. Technirama combines many of Technicolor's improved techniques such as new blank film stock, new printing techniques that overcome effect of grain, and, of course, greatly improved optics.

One of the engineering aims in developing Technirama was to permit large-screen closeups to be freely used and intercut with medium and long shots for a screen result that is relatively free of picture depth distortion.

### *2,000-Foot Magazines*

The standard Technicolor camera and blimp lent itself ideally to conversion to Technirama. Because the 8-sprocket (double-frame) film movement doubles the rate of film consumption, Technicolor is now providing 2,000-foot magazines for its Technirama cameras, thus reducing the frequency of film re-loading to that of standard single-frame cinematography.

The larger film magazines are powered by individual motors thus relieving the camera motor of undue strain. By design, these motors start turning a second or two before the camera motor starts, after being switched on, and continue turning for a like fraction of time after the camera motor is turned off. This takes up any slack in the film and reduces the danger of film breakage or buckle.

The two-camera set-up shooting a fast-action scene. Reflectors are used to throw light into shadowed areas.

Many directors of photography feel that, aesthetically, a great deal often is sacrificed by shooting a picture in wide-screen format. "But," says Daniels, "it looks like big-screen is here to stay and Technirama unquestionably is the answer to all the ills that, until now, have confronted cameramen undertaking wide-screen photography. With Technirama, we are able now to achieve in wide-screen the fine quality photography that marked the better cinematographic accomplishments of pre-CinemaScope days."

## Research Council Announces New Developments

William F. Kelley, executive director of the Motion Picture Research Council, has recently announced two new aids for projectionists: an inexpensive screen brightness meter, and a 50-page folio of technical information bulletins.

The meter may be operated by any theatre personnel without previous experience, and is able to read screen brightness from any section of the theatre—projection room included. Besides the meter's economy and ease in manipulating, another feature is its significance to the industry in the matter of print density for release prints. Accurate information can be supplied the studios by regular and numerous checks of screen light. The meter requires no warm-up or zero adjusting, and a pair of ordinary flashlight batteries will keep it operating approximately two years.

The technical information booklet is a compilation of various projection-problem bulletins issued in the past. Supplemental bulletins, after clearing, will be forwarded to those on the mailing list.

The folio contains a variety of suggestions and technical aids from descriptions of various test films to methods for checking screen brightness, and instructions for aligning the arc lamp optical chain. Also included is a description of the MPRC all-purpose alignment film. (See IP, May 1957, p. 7.) The folio may be obtained from the Council at 6660 Santa Monica Blvd., Hollywood 38, Calif.

Fred Beard, field representative for the Research Council, has recently returned from a six-week tour of Texas and Louisiana, where he visited approximately 100 theatres. The two major problems he encountered in the field were screen brightness and focus drift, both in hard-top and drive-ins.

In the four-wall theatres, Beard found that high-gain screens suffered serious picture fall-off when viewed from the side or from high angles. Proposed remedy is proper curving and tilting of the screen.

The extruded aluminum screen used in drive-ins, according to Beard, was giving about twice the amount of light than the painted surface screens.

Beard reported that focus-drift is caused by a projector starting in a cold condition. and, as the lens heats up, focus changes, necessitating refocusing the hot lens. On the next changeover, if the lens is still in its hot focus position, result is a fuzzy picture. Beard suggests that projectionists mark the focusing nob to indicate cold focus position, and change when the lens heats up.

The field representative, who stated that he has been receiving excellent cooperation from both exhibitors and IATSE Locals, has started on another field tour.

## New 3-D Effect

A new three-dimensional process which claims for itself 3-D effect without the use of glasses is being developed by Alvin and Mortimer Marks of Whitestone, Long Island. New York. To secure backing, the process is now being demonstrated to various groups of motion picture executives.

This latest attempt at 3-D uses two screens and two 16-mm projectors. One screen, semi-transparent, is placed a few feet in front of the other. The set-up requires one projector throwing on the front screen in the usual manner, and the other projector—set at an angle—shows on a mirror which throws the background portion of the picture to the rear screen.

The Marks brothers claim that a theatrical adaptation can be developed, carrying both background and foreground images on the same film strip, using only one projector. This, presumably, would require a beam-splitting device to angle one of the images to the rear screen.

Photographic process of this new system is believed to involve two cameras. Envisioning a packaged deal that would include the special multiple screen unit, the Marks brothers are now awaiting backing.

**A vital factor which directly affects projection operation and also the health of the projectionist.**

# Methods for Ventilating The Projection Room

By JOSEPH HOLT

Member, IA Local 428, Stockton, Calif.

VENTILATION of the projection room is one factor which vitally affects the operation of the projection equipment. At the same time the physical comfort, alertness, and health of the projectionist suffer from improper ventilation. For these compelling reasons it is necessary to take frequent surveys of the ventilating requirements of rooms in which equipment changes are made or the efficiency of the ventilating devices may be impaired.

The standards for projection room ventilation are frequently fixed by city and State codes, many of which were drafted during the years when sufficient knowledge did not exist to design proper ventilating set-ups; at the most, the standards adopted were in most cases at minimum levels.

Let us look at some of the circumstances which may render almost worthless a system which may meet the standards of antiquated codes . . . .

The first requirement of ventilation equipment is that it must be capable of moving a sufficient volume of air to provide a complete change of air within a certain time limit. The usual figure given is one change of air each ten minutes for projection rooms. One midwestern State code provides a different approach to the problem by prescribing a factor related to the floor area of the projection room.

### *Eight Minute Change*

In this method, let it be assumed that a room is 12′ x 24′. With these dimensions, the floor area will be 288 square feet. The factor given for projection rooms is two, and our calculated capacity of the room ventilating fan would be 476 cubic feet per minute.

Comparing the figure we have obtained under this method, we assume the room to be 12′ x 24′ x 9′, and arrive at a content of 4,284 cft. If we use a fan of 500 cfm. size, we would obtain a theoretical air change in eight minutes, which checks with our figure of ten minutes given in so many codes.

So much for the requirements of the room air space; but what of the ashes, gas, and heat arising from the operation of the arc lamp? So many variables enter into the operation of lamps that most manufacturers have found it better to specify that "sufficient" draft be maintained at all times. One manufacturer suggests that the draft be maintained at the maximum amount which does not adversely affect arc operation, and we could hardly do better for a standard.

One of the best systems the writer has ever had a hand in using or designing provided a 600 cfm. fan on the lamps and a 300 cfm. fan on the room proper. The lamp fan was by-passed by suitable duct-and-damper arrangements in order to allow for the proper amount of draft through the lamps during operation.

During cleaning periods, the by-pass openings could be readily closed and sufficient draft obtained through the lamp to pull a rag out of the projectionist's hand. This provided a sure means of exhausting all ash as it was dislodged during cleanup.

The factor not to be overlooked is the relative ability of the lamp fan to preserve a positive flow upward through the lamp stacks under all conditions.

The writer has observed in rooms from coast to coast the same sort of thinking which has been traced thus far. Attention has been given to the installation of adequate fans to meet the requirements of both lamps and the room proper, yet there are few instances indeed in which the next important step is taken.

### *The Intake Problem*

It should go without prolonged argument that if the ventilating equipment is to operate at a point commensurate with its rated capacity, there must be provided a means of intake to the room. Codes almost uniformly provide little or no guide as to intake air in a form which will be usable the year round.

Many codes prescribe openings of certain dimension, and content themselves with reference to "outside air", which is indeed plain enough, but hardly the type intake air which will best serve the projection room equipment and occupants.

As a demonstration of what is meant, let it be considered that we have our room equipped with proper fans, and that ducts be brought in directly from outside air. The large volume of air brought in will carry in most areas a quantity of dust, and in altogether too many cities corrosive fumes and offensive odors.

The practical result of this situation

(*Continued on page* 34)

## Look, Ma—No Carbons!

IDEAL KINEMA reports on a new carbonless, European projection lamp:

The color of light from a xenon discharge is practically the same as daylight, and slightly superior to that of an HI arc. The xenon lamp needs no re-carboning, no adjusting, and has no mirror to deteriorate. The light is perfectly constant, and there are no fumes or dust. The lamphouse has no moving parts.

The lamp is made in two models. The 1000 W model runs at 22 volts and has a light output of 2400 lumens. The larger model consumes 1800 W, runs at 26 volts, and has a light output of 4000 lumens, enough for the screen of the average cinema. Maximums of 26 ft. wide for the 1.75:1 ratio, and 38 ft. for the CinemaScope ratio have been mentioned.

On the face of it, this is an ideal illuminant; but it has certain disadvantages. First is the fact that the low voltage means a correspondingly high current, and heavy cables are needed. There is a slight risk attached to it since the xenon operates at a pressure of several atmospheres. The risk of explosion is very slight, but it should be guarded against.

# A New Concept on the Physiological Aspect of Stereophonic Sound†

By HOWARD F. HUME

**The author describes a series of experiments designed to establish the factors that provide the stereophonic effect and to analyze their results in practical terms.**

STEREOPHONIC SOUND has, in recent years, become an important consideration in the reproduction of sound for entertainment. Motion pictures, tape, and disc recordings in stereo sound are now widely used and more recently the poor relation in the sound field—the public address system—has changed to stereo.

The word "stereophonic" is derived from the Greek word "stereo" meaning "firm" or "solid," and "phonic" meaning "sound.' This word should not be confused with "binaural" which simply means "two-eared." The stereophonic effect may be produced to some degree with one ear only though more exact when produced binaurally.

The common denominator in any present day stereo sound system is a pair of independent sound pick-up and reproducing systems wherein one system gathers and reproduces the sound emanating from the left side of the source and carries that signal to the left ear while the other system gathers the right-side sounds and transmits them to the right ear. This basic scheme has, of course, been modified in several ways. Sometimes a third or fourth channel is added to fill in the void between the extreme left and extreme right positions. In some cases, an amplifier bridges the two primary channels and a signal which is a combination of the two primary signals is reproduced in the center position in front of the listener.

Any of these arrangements produces only a near-stereo effect in the listener's mind and tests show that not every listener is convinced he is hearing true solid sound. The sensation more often experienced is that of an awareness of sound being louder on one side than the other. Multi-track motion pictures produced the latter effect, and not convincing stereophony.

## Source Orientation

Much has been written on the theory and practice of the stereo effect, but many of the writers disagree. This author submits that the reason the writers disagree is that there is a misconception on which a good deal of thinking has been based and which has seriously retarded the development of the techniques. The question, "Why are creatures able to orient a sound source?" must be answered satisfactorily before any successful attempt can be made to reconstruct the perception of direction at a distance from the source.

Let us take a quick look at the human being again and review one or two basic principles. He has two ears, one on each side of the head, but except for a narrow band running vertically from the ground up and over his head, the path of the sound to one ear or the other is always obstructed by the head. The part of the ear which is stimulated by airborne sound waves is called the "inner ear" while the part that projects from the head's the "extenal ear." The exterrnal ear projects from the side of the head at an angle to a line normal to the side of the head.

It has been believed that a creature can isolate a sound source in space because of one or more of the following reasons:

(1) The distance between the ears creates a time delay in a transient or any change from a steady state sound and this time difference provides the information to the brain.

(2) The distance between the ears creates a phase difference and this difference provides the information.

(3) The amplitude of the signals reaching the inner ears differs and that difference is used by the brain.

It has been further decided that each condition contributes some information and one effect confirms another, increasing the chances of a correct conclusion.

All writers agree that the stereo effect is produced by some differences in signal received by the two inner ears and the preceding three theories have been offered to explain what the difference is. It is at this point that this author disagrees with the others.

We do agree there is a difference in signal, else why two ears. Also, we do agree that these three phenomena (namely, time delay in transients, phase shift, and amplitude difference) can, under certain circumstances, produec some differences in the left ear and right ear signals as received. This author believes that such differences in signal are not used in the perception of direction. We believe that the total value of these three conditions is, at best, in confirming a conclusion already reached by the brain .The difference in signals as received that does produce the stereo effect is a difference in wave shape.

## Physical Reasons

The head and external ear, because of their size and shape shadow or filter out certain frequencies. In the head, for example, the frequency is approximately 800 cps and above. The external ear shadow higher frequencies and because of its angle, from a different direction. It is this shadowing process that produces a difference in waveform in the signals received by the two inner ears and which is used by the brain to make the perception of direction possible. Stated in another way, the stereophonic effect is produced by a difference in high-frequency or harmonic content, created

### STEREO CAN COST MUCH LESS!

IP believes the experiments described in Mr. Hume's article are worth the utmost attention, not only of projectionists but of the entire industry. If Mr. Hume's conclusions are confirmed by other investigators sterophonic sound should become commonplace, both in the theatre and everywhere, for he finds that the expensive *low*-frequency amplifiers and speakers are not necessary and add nothing at all to the stereo illusion. Only the relatively very cheap high-frequency speakers and amplifiers need be added to the conventional single-channel speaker. "Only the high notes and harmonics should be reproduced by a dual channel system." His cross-over point (above which dual equipment becomes desirable) is 800 cps.

† Reprinted by permission from AUDIO Magazine, March, 1957

by head and external ear shadowing, of the sound signals reaching the inner ears.

According to Oliver Read,[1] "Sounds having very low frequencies possess the most power and result in naturalness and apparent loudness. High-frequency sounds provide intelligibility." We add to this statement that the lower frequencies also convey the mood or emotion of the sender. The high frequencies contain the message and provide intelligibility, and the higher the frequencies that are passed in the transmission, the greater the intelligibility of the message and the more complete the description of the source.

The fundamental frequency of the human voice in speaking rarely exceeds 1000 cps. The note "C" two octaves above middle "C" is 1024 cps. The frequencies above 1000 cps are usually harmonics and are necessary for exchange of messages but have no effect on apparent loudness.

The head shadows the components above 800 cps while the external ear shadows the components beyond 5000 cps approximately. The exact values of these thresholds are vague because of the wide range of shapes and sizes found in nature, as well as the difference in angle at which each may obstruct the path of the sound. But for all practical purposes, these two figures seem acceptable.

The region in which the maximum stereo sensitivity exists is a narrow band directly in front of the face, extending from below horizontal to about 45 deg. above horizontal. The point of maximum stereo sensitivity is straight ahead. The reason for this is simple. It is in this direction that the two external ears gather, in total, a maximum measure of high frequencies and it is from this position that a unit amount of movement of the listener's head produces a maximum amount of change in difference in wave shapes of the signals reaching the two inner ears.

If it ever becomes possible to measure human sensations more exactly it will be possible to plot the degree of stereo sensitivity throughout the full circle about the human head. It is obvious that the reason creatures turn their heads to face a sound source is twofold: first, to obtain maximum intelligibility (highest readability of the message); and second, to obtain maximum accuracy of orientation (maximum stereo sensitivity).

### Experimental Results

Several experiments were conducted on the stereophonic effect and the more significant results are shown.

*Experiment 1.* Four subjects were asked to orient a sound source in a 360 deg. circle about the subject. The sound was 100 cps "pure" sine wave. The result was that in several tests subjects were unable to agree, unable to isolate source with any accuracy.

*Experiment 2.* Same as 1 except frequency was 1000 cps. This resulted in an average accuracy of 25 per cent.

*Experiment 3.* Same as 1 except frequency was 8000 cps, and this resulted in an average accuracy of 75 percent. Thus we conclude that subjects orient "pure" sine wave tones with a low degree of accuracy.

To support this evidence, Dr. K. de Boer, working in the Philips Laboratories, Eindhoven, Netherlands, found that "for steady sounds and especially for pure tones, the perception of direction in a room is not only difficult but often even false." As a result, Dr. de Boer used mostly speech for his experiments. It will be remembered that speech is rich in harmonics. We believe the principal reason a source of "pure" sound can be isolated at all is that all oscillator-amplifier-reproducer combinations generate some harmonic distortion, even though that distortion may be low is terms of percentage. We feel that it is because of these spurious frequencies plus random amplifier noise that it is possible to orient a so-called pure sine wave at all. Then, again, pure sine waves rarely occur in nature, so creatures are not required to cope with the problem.

The next series of experiments shows the effects of phase difference and amplitude difference.

*Experiment 4.* Two identical reproducers emitting a sine wave, in phase, were held opposite the ears of the subject. With one held stationary, the other was moved toward and away from the subject so that with the frequencies used, the phase difference ranged from 0 deg. to 360 deg. As a result the subjects reported no stereo effect.

The phase shift theory has some notable weakness that may be shown simply: (1) For phase shift to occur at all in the two ears there must be some measure of periodicity. Yet creatures are able to orient sources of random or non-periodic sound with accuracy; (2) The phase shift for a sound of a certain frequency could be the same for at least two different positions of the head. For example, let us say that a source is at 45 deg. left of front center, The time difference between the left and right ear received signals is the same as if the source were 45 deg. left of rear center.

This argument also holds for the time of arrival of transients. Note too, that in this case the difference in amplitude of the signals would be the same. Present theories have all ignored the fact that creatures can isolate a sound source behind them with some accuracy.

We feel that this reasoning, plus the results of Experiment 4, shows that phase shift with or without amplitude difference, is not the difference in signals required by the brain to orient.

### Blindfold Test

(It should be noted that in all the experiments the subjects were blindfolded and not told what form the experiment would take. They were simply told to describe the sensation or illusion experienced.)

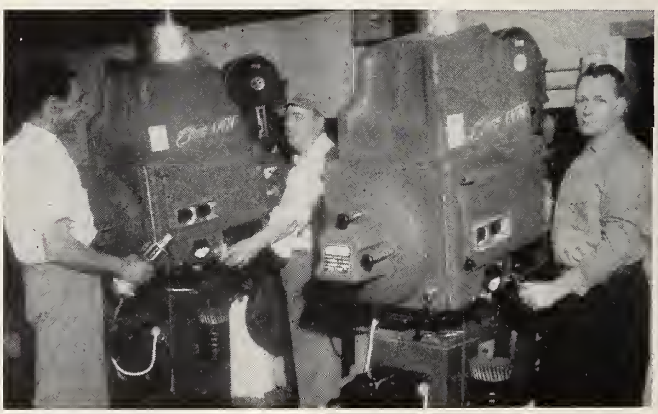
*Experiment 5.* The construction of the experiment was the same as in 4 except that a variable dividing network was used to increase or decrease the amplitude at the reproducers in equal and opposite directions. The results were the same as in 4; there was no illusion of the source moving, merely the sound was louder on one side than the other.

It was decided next to investigate the effects of shadowing. In the Experiments 6 and 7, an audio oscillator provided a sine or square wave source which was amplified and then reproduced in air with a wide-frequency-range loudspeaker. Five feet in front of the reproducer, a microphone picked up the signal which was amplified and supplied to an oscillo-

(*Continued on page* 28)

[1] Oliver B. Read, *The Recording and Reproduction of Sound* 2nd Edition. Indianapolis. Howard W. Sams & Co.





# TELECASTS

## Toll TV: Headache, Saviour, or Bust?

PROJECTIONISTS should be well acquainted with the phrase "Quo Vadis?" since they last showed Robert Taylor charioting down the Via Appia. Lately they may have had cause to reflect on the meaning of those two loaded Latin words ("Whither art thou going?" or "What gives?") An experiment in Bartlesville Oklahoma, which has been followed with some interest by this department (see Telecasts, IP, March 1957), has touched off what has been smoldering in the TV industry for lo these many: pay-as-you-see-TV.

Toll TV has recently invaded even the I-only-read-the-sports-page audience. Baseball and TV, for good or bad, have been more or less shotgun-wedded since they first took the cameras up to Yankee Stadium. For some time now the Dodgers and Giants have had itchy feet for a number of reasons, and this year the faithful have been grieved to note that both teams have seriously considered moving to the West Coast. One of the persuading arguments for the move has been the tentatively promised lucre from paid video. (Interesting to note that the nucleus of the toll TV hassle has been in the West and Southwest; the East Coast is pennant country, and there are many subways.)

Within its own ranks, pay TV has its own competitive dissension. There are two camps: wired pay-TV, and scrambled pay-TV. Scrambled pay-TV was on the scene first with Zenith, Skiatron, and Telemeter each offering its own version. Basically, wired toll provides programming by coaxial cable or similar lines to subscribers; scrambled toll broadcasts an unintelligible picture over a regular channel unless the subscriber attaches a decoder to his set. Methods of payment vary in each system—either a coin box attached to the home set, or a monthly bill submitted—most probably through the telephone companies — to the subscriber. Considering the collection problem, at the moment the monthly rate has the edge.

### Wired Pay-TV Edge

As, also at the moment, wired pay-TV has the edge. A number of recent develments point to this: the telephone companies are interested, objectively; both Skiatron and Telemeter, former advocates of the scrambled system, have made excursions into the wired field—Skiatron recently applying for a closed-circuit franchise in Los Angeles, and Telemeter offering free daytime operation up to 7 p.m. before charging. Either operation tends to make a commercial TV station operator out of the exhibitor.

The FCC, in the middle, is doing some watchful waiting. For one thing, it is in the realm of possibility that subscription TV would have to stand the test of constitutionality. Some constituents in Congress have questioned the legal authority of the FCC to sanction toll TV at all. Heretofore, the networks have always been a free service for the public with the advertisers picking up the tab. But let it be noted that many sponsors are beginning to feel the pinch of increased program costs.

Even among allies there is conflict. Paramount holds controlling interest in Telemeter, yet Leonard H. Goldenson, president of American-Broadcasting-Paramount Theatres has gone on record very definitely against tollvision. The Committee Against Pay-TV while agitating against any form of "slot-machine TV," is not opposed to cable transmission, such as being prepared in Bartlesville. The Hollywood AFL Film Council has passed a resolution asking the FCC to authorize public tests of subscription TV, feeling that tollvision would hypo production of pictures, yet Barney Balaban, president of Paramount Pictures and a major proponent of Telemeter, feels that a flat monthly payment "would destroy the incentive to produce better quality pictures." Also the Hollywood Council proposal is to be introduced at the September convention of the California State Theatrical Federation, and the Federation has already said nix. (See Spotlight this issue.)

### Confusion, Confusion

Are you still with us?

John L. Burns, president of RCA, feels that if paid TV is successful, "all vested interests will get into it with both feet." Yet he doesn't believe it will be successful. The telephone companies, who will do the line-stringing or the cable-laying, are wondering whether to rent out the system, or rent out pole space, whether the system will fit in other public services, and what the rate structure should be. Still, they are interested. Pertinent to this, while the largest potential market for toll TV is New York City, it offers the most difficult and expensive problems to the prospective tollvision operator.

You pay your money and you take your choice—and there's the rub. Will the viewer be willing to pay for what he sees? Is there any guarantee of quality for what he's going to see? Are the rates going to rise as time goes by, as some Congressmen seem certain they will? Will the viewer find himself planking down $9.50 for a 21-inch view of a 400-foot ball park he can see completely for as little as 75 cents?

It would seem that there are problems to be ironed out. Toll TV may be the panacea that both the TV and motion picture industry have been looking for. It also may be like the fabled fat queen who tried to sit on two chairs at once and found herself making a sizeable dent in the floor.

Still, someone has to project all that product. And projectionists have worked successfully from some pretty weird situations before.

## Scanoptic — Anamorphic TV

WIDESCREEN TV will be available, at least to closed-circuit systems. due to a process developed by Seymour Rosin of Scanoptic, Inc., New York. Operating on the basic principle of squeezing and unsqueezing, an anamorphic lens attached to the TV camera squeezes the image, and at the receiving end a special receiver unsqueezes, giving an aspect ratio of 2.66/1 (inches). This method is used because the designer considers that a pick-up of an unsqueezed wide-angle picture would not be efficient electronically.

Although there is a special flat picture tube now in development at Kaiser Aircraft and Electronics Corp. in California, at present Scanoptic is using the average home TV receiver, modified, masked in at top and bottom to eliminate blank spaces, another anamorphic lens being placed in front of the projector. This process also permits prints of the regular CinemaScope type to be kinescoped directly.

However, while using the regular 525 lines scanning rate of commercial TV, Scanoptic carries more picture information, and therefore requires a wider telecast band. The FCC has designated that broadcasting bandwidths for TV be 4.5 megocycles; Scanoptic needs 9 megocycles, which would require a change in telecasting equipment and authorization of the FCC. No such change is expected, but the developers believe that the wide-

(*Continued on page* 33)

**The function of this department is to provide a forum for the exchange of news and views relative to individual and group activities by members of the organized projectionist craft and its affiliates. Contributions relative to technical and social phases of craft activity are invited.**

# *In The* SPOTLIGHT

THE forthcoming — September — convention of the California State Theatrical Federation should provide a warm forum on toll TV. Recently, the Hollywood AFL Film Council, representing over 24,000 employees in the industry, called on the FCC to authorize widespread public tests of subscription TV at the earliest possible moment.

The Council foresees "additional employment for tens of thousands of American workers," and in a unanimously adopted resolution stated that subscription TV probably would greatly increase the number of motion pictures produced in this country. The resolution, which will be presented to the California State Theatrical Federation at the September convention, and to all international labor unions and councils, also considers that TV programming would be of a better quality than the present sponsored product.

However, the Federation, representing 70,000 workers, has come out square against the proposal, asserting, through William P. Sutherland, secretary-treasurer, that "Public interest demands that toll TV—or any tests of toll TV—should not be permitted."

Previously, AFL-CIO President George Meany had reminded the FCC of labor's unanimous stand at the 1956 convention against toll TV, declaring that paid video ". . . would be against the public interest."

There seems to be little or no dissension on the East Coast. Through Tom Murtha, chairman of the 10th District, which is comprised of IA Locals in the state of New York, that body has come out solidly against toll TV. Murtha told the FCC that the unions are not going to stand by and let paid video grab the airwaves. It is Murtha's contention that tollvision is an "infringement on the property right now enjoyed by the general public on a no-fee basis." He is in direct opposition to the Hollywood Film Council idea that toll TV would increase employment. "It would have the opposite effect if this vicious system was ever permitted," he stated.

• IA President Richard F. Walsh, no stranger to travel, was a delegate to the Fifth World Congress of the International Confederation of Free Trade Unions which met in Tunis, capital city of Tunisia, North Africa, July 5-13. If we remember correctly, Tunisia is not the most comfortable place to be in July, but international good will and cooperation take precedence over weather discomforts.

• The Frank J. Keilhacks of Kansas City, Kans., celebrated their golden wedding anniversary June 30 by holding open house for all their friends. Frank Keilhack has been a member of Kansas City Local 498 since 1911, and has served as Local president for the past 20 years. Born in Waterloo, Ill., 70 years ago, he has been a resident of Kansas City for 68 years, 49 of which have been devoted to the motion picture industry. He retired June, 1956. The Keilhacks have one son and three grandchildren, one of whom, Donald, recently returned from Germany where he was a student at the University of Hamburg. Donald is also an accomplished pianist, playing with the Star Light Theatre Orchestra in Kansas City.

• "A honey of a party," is the apt phrase describing the June 13 meeting of the 25-30 Club which was held at the Cadillac Restaurant in New York City. The phrase, incidentally, is John L. Alden's, president of International Projector, Division of Simplex Equipment Corp., in whose honor the dinner was given. And a honey of a party it was—with a record turnout of Club members, including past and present officials, and top Simplex and National Theatre Supply executives.

After the opening remarks by Nathaniel Doragoff, Club president, toastmaster Morris Rotker, past president, introduced the visiting dignitaries among whom were representatives from a number of upstate IA Locals: Larry Sherman and Lionel Wilcox, from Syracuse Local 376; Ed Harris, Westchester County Local 650; Charles Perez and Albert Tins, Monticello and Port Jervis Local 353; Ed Dougherty, Anthony Boscarelli, and William Anderson, Local 384, Hudson County, N. J.

Among the International Projector luminaries hosted by the Club were C. M. Leeds, vice-president of manufacturing; Arthur Meyer, vice-president and sales manager; Willy Borberg, design engineer (GPL); Barry Passman, vice-president of engineering, and John P. Russell, comptroller.

The major Broadway houses were well represented by Charles Talley, chief projectionist at the Roxy Theatre; Charles Hortsman, chief of maintenance

**ONE OF THE TABLES AT THE RECENT 25-30 CLUB PARTY**

Shown here is a group of 25-30 Club members, left to right (clockwise): Nat Strauss, Anthony Boscarelli, Joseph Pearlman, John Krulish, Abraham Kessler, Edward J. Dougherty, Harry Mackler, Jacob S. Winick, Morris J. Rotker, Allen G. Smith (honorary member), Charles Perez, Albert Tins, Larry Sherman, Lionel Wilcox, Joe Abrams, Robert Saunders, and Julius Wetzler.

and sound for RKO; Milton Berkowitz, chief projectionist, Capitol Theatre; Ben Olevsky, Radio City Music Hall; John Rollman of the Rivoli Theatre, and Gio Gagliardi, from Stanley Warner. Clarence Ashcraft, manufacturer of the Ashcraft Super Cinex projection lamp, Les Davies of Altec Service, and IP's Robert MacLeod were invited guests.

After the mundane business of bills was dispensed with by Club treasurer Benjamin Stern, Morris Klapholz, secretary, motioned that a telegram be sent to ailing P. A. (Better Projection Pays) McGuire, which was passed unanimously and acted upon immediately.

A slide-illustrated talk by Willy Borberg on the development and accomplishments of the water-cooled curved gate for the Simplex XL was a highlight of the evening. The demonstration was followed by a lively question-and-answer forum, which was finally interrupted only for time's sake.

Marty Bahn of National Theatre Supply Co. projected a 16-mm short depicting the historical projector collection of Don Malkames, member of IA Local 644. Don's museum, previously described in IP, holds one of the largest and most interesting projector collections in the country.

It is hardly necessary to mention that this was one of the Club's most outstanding meetings. Wined, dined, speeched, and entertained, with the tab picked up by International Projector and National Theatre Supply jointly, the Club members adjourned to plan and await the next gathering.

• John F. Brownsell, member of Toronto Local 173, recently joined the ranks of projectionists inducted into the Famous Players 25-Year Club. Other Canadian IA men who became eligible this year for membership in the Club include Ronald P. Marchant, R. W. Crabbe, J. H. Johnson, members of Local 300, Saskatoon; J. R. Foster, Local 348, Vancouver; F. E. Hoffman, Local 262, Montreal; James P. Whitebone, Local 440, St. John, N. B.; Dale Leach, Local 302, Calgary; and F. Nash, Local 299, Winnipeg.

• Northwest Sound Service, Inc., of Minneapolis, Minn., supervised the Todd AO installation of "Around the World in 80 Days" which opened recently at the Academy Theatre in Minneapolis. This service organization will observe its 7th birthday next October and boasts that it employs only IA sound engineers.

• Hugh Usher, secretary and business representative for Local 303, Hamilton, Ont., has joined the editorial staff of the *Hamilton Labor Digest*, conducting a monthly department titled "Movie News." The *Digest* is a prominent labor periodical in Canada with a monthly circulation of 35,000.

## 25-30 CLUB HONORS INTERNATIONAL PROJECTOR'S JOHN ALDEN

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Left to right: John Alden, president, International Projector; Not Doragoff, 25-30 Club president; Allen G. Smith, National Theatre Supply; Gio Gagliardi, Stanley Warner, Clarence Ashcraft, Ashcraft Mfg.; and Charles Horstman, RKO supervisor of maintenance and sound.

Left to right: Barry Passman, vice-president in charge of engineering, International Projector; Willy Borberg, design engineer, General Precision Lab.; Marty Bahn, National Theatre Supply; John P. Russell, comptroller, International Projector; Bill Nafash, engineer, National Theatre Supply; C. M. Leeds, vice-president in charge of manufacturing, International Projector, and Harry DeFura, technician, International Projector.

Left to right: Charles Talley, projection supervisor, Roxy Theatre; William Anderson, vice-president, 25-30 Club; John Alden, president, International Projector; Nat Doragoff, Club president; Allen G. Smith, NYC branch manager, National Theatre Supply Co.; Morris J. Rotker, past president, 25-30 Club; Arthur Meyer, vice-president and sales manager, International Projector (honorary member of the Club); and Morris Klapholz, recording-secretary of the Club. Standing, rear, unidentified.

## Unions Nix Toll TV

Union papers throughout the country will be carrying the AFL-CIO animus against subscription TV this and following months. A signed declaration of policy by President George Meany has gone out to the union publications, which have an aggregate circulation of around 15 million readers.

Text of Meany's declaration is: "We believe the granting of licenses for this purpose (toll TV) would be against the public interest and greatly curtail the use of this valuable medium of TV. We urge the FCC deny the applications now pending."

To date, the FCC has tabled any decisions on toll TV, and is not expected to act on the issue until "sometime in the near future." This hesitance, however, has caused some disgruntled comments.

**What Is YOUR Problem?**

# Projection CLINIC

## "Vignetting" (Fadeaway) Means Inefficiency

"SLOW" LENSES can give good screen results only with "slow" arc lamps; "fast" lenses with either "slow" or "fast" lamps. But the important thing to remember is that modern optically rapid arc lamps require modern "fast" lenses for maximum screen light without *vignetting*—a fadeaway of light at the sides and corners of the projected picture.

The first practical data on lens vignetting was prepared by the Strong Electric Corporation of Toledo, Ohio, and published in a comprehensive article by Arthur J. Hatch ("Screen Illumination: Some Pertinent Facts," IP for February 1957, p. 10 *ff.* with the lens-vignetting table on p. 30). Neither the makers of lenses nor a leading arc-lamp manufacturer, such as Strong, wish to see their products handicapped by optical inefficiency in the projection room.

From the theoretical point of view, a *slight* optical mismatch prevails when lamp and lens have the *same* *f*-number. However, the mismatch in such a case is too slight to produce visible effects on the screen. You may thus be assured that your patrons are getting maximum picture brilliance and sharpness when you project with "fast" (*f*:1.9—*f*:1.5) *coated* lenses working in conjunction with a pair of the amazingly efficient new lamps burning 13.6-mm positives and having mirror speeds up to *f*:1.6.

Aside from the increased overall brightness, elimination of the vignetting effect by means of the new lamps and lenses has such favorable results as regards lifelike brilliance and clarity of projection that the exhibitor who wants to stay in business during these competitive times will certainly avail himself of the equipment now being offered. The difference on the screen may mean the difference between loss and profit. It is a difference that the public appreciates and the projectionist welcomes.

### Angles and Focus

THERE'S ANOTHER matter we'd like to get off our chest, too. Don't let anyone tell you that steep projection angles play havoc with the *focus* of the picture! They don't—they can't. No matter whether your screen is tilted or not, and no matter whether your projection angle is a steep one or not, *any difference in lens setting between top and bottom, or between the two sides of the picture, indicates assymetrical positioning of the film.* In other words, the film-gate runners and tension pads are worn. If the film runners are in perfect condition, you can project from seventh heaven down into the orchestra pit, and your picture will be sharp all over!

Yes, this can be explained. Projection lenses have a very small *depth of focus* (showing up film-flutter and buckle readily), but a rather great *depth of field* (allowing the screen to be moved toward or away from the projector over a wide range of distances without requiring changes in the focus-setting).

We don't always appreciate the great depth of field of projection lenses because the "throw" remains a fixed distance. Only in those theatres having two screens, the front one "flown" to permit projection upon the back one, will it be seen that the lens is surprisingly indifferent to changes in the throw.

Short-focus lenses have the smallest depth of focus (revealing film buckle very readily), but the greatest depth of field. As Fig. 1 shows, a 2-inch lens focused for the sharpest possible image on a screen 80 feet away will also give a clear picture, without "touching up" the focus, on a screen 150 feet away. Considering that the depth of focus of a 2-inch projection lens is about 0.002 inch, such a lens will give a clear picture from "infinity" down to a distance between 100 and 140 feet without resetting the focus. This distance is what photographers call the "hyperfocal distance."

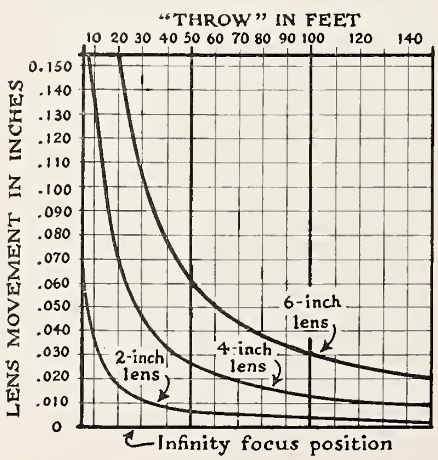



FIGURE 1.

Lenses of longer focus—say 4 and 6 inches E.F.—have a smaller field depth, but nevertheless readily tolerate changes in the throw from 10 to 20 feet at the usual projection distances without the necessity of altering the focus. The *depth of focus* of a 4-inch lens, however, is about 0.003 inch, while that of a 6-inch lens is about 0.004 inch.

Film and screen occupy the "conjugate foci" of the projection lens. These two foci are related to the focal length (E.F.) of the lens in the following way, $d_1$ and $d_2$ being the distances of the conjugate foci from the lens:

$$f = \frac{d_1 d_2}{d_1 + d_2}$$

Turning this equation about to solve for one or the other of the conjugate foci, we get:

$$d_1 = \frac{d_2 f}{d_2 - f}$$

which was the formula used for calculating the data from which Fig. 1 was constructed.

Fig. 2 shows the actual conditions prevailing with a 24-degree projection angle when 3½-inch lenses are used with 1.85/1 wide-screen apertures measuring 0.825″ x 0.446″. At a throw of 82 feet (984 inches), the height of the picture *projected at a O-degree angle* would be calculated by:

$$H = \frac{dh}{f} = \frac{984 \times 0.446}{3.5}$$

which equals 125.390 inches, or 10.449 feet. On a vertical screen *when a 24-degree angle prevails,* however, the picture is higher than 10.449 feet on account of the effect of "image elongation." This, of course, is the case we are interested in; and the simple formula does not help us to calculate the true picture height. We must use a formula involving a trigonometric function, namely:

$$H = \frac{dh}{f} \sec\left(\frac{\theta h}{f^2} + \theta\right) =$$

$$H = \frac{984 \times 0.446}{3.5} \sec\left(\frac{24 \times 0.446}{12.25} + 24\right) =$$

$$H = 125.390 \times \sec 24.874 =$$

$$H = 125.390 \times 1.092 = 136.926 \text{ inches,}$$

which equals a picture-height of 11.411 feet. The projection angle of 24 degrees has thus made the picture 11.411 — 10.499 = 0.962, or approximately 1 foot

greater than normal in the vertical dimension.

As shown in Fig. 2, the bottom of the vertical screen is about 2½ feet farther away, and the top 2½ feet nearer, than would be the case if the screen were perpendicular to the projection axis. *Does this 5-foot focal difference affect the focus of the picture? Not in the least!*

Referring back to Fig. 1, it is seen that a 2-inch lens focused for 82 feet will give a clear picture as close as 60 feet or as far away as 150 feet. A 4-inch lens focused for 82 feet gives a sharp image from about 70 to 90 feet, while a 6-inch lens focused sharply at 82 feet provides a clear image from 75 feet to more than 85 feet. In all these cases, the depth of field is greater than the 5 feet required in this instance!

The inescapable conclusion: unless the film-gate runners be worn or misaligned, steep projection angles do not affect the focus of the picture.

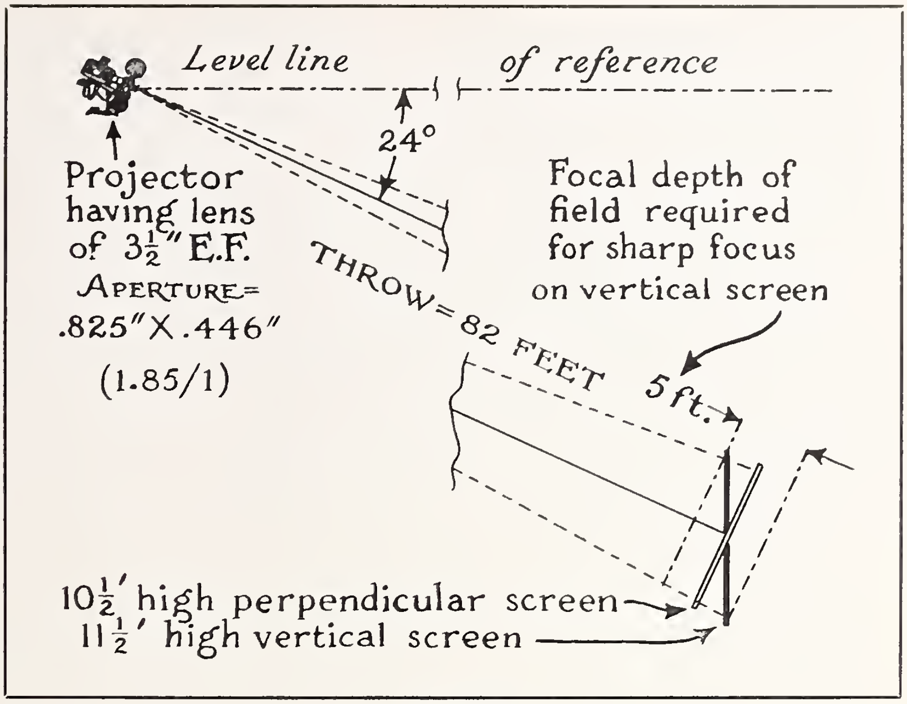



FIGURE 2.

## Some End-Play Necessary

*Is end-play allowable in the shafts of projector mechanisms?*

A CERTAIN AMOUNT of end-play is not only allowable, but absolutely necessary to prevent hard starting, bindups, and undue wear of washers, bushings, bearing collars, etc. Except when ball bearings are employed, the shafts of drive and intermediate gears, feed and hold-back sprockets, and the like, require sufficient end-play to allow a perceptible in-and-out movement of the shaft when tested with the fingers.

Shutter shafts should also have end-play, although too much "looseness" may result (in certain mechanisms) in "hunting" of the shutter with flicker, travel ghost, and clicking noises.

Modern automatically lubricated mechanisms need less end-play than do old machines having worn sleeve bearings. The intermittent movement is an exception to this general rule, however, for even old-style heads should have intermittents in brand-new condition. While there must be enough end-play in the sprocket-and-star shaft to provide running clearance, the amount required is almost too small to be detected with the fingers. Sufficient end-play is provided when the sprocket of the disassembled movement turns freely without perceptible "drag."

Guard against mistaking wear in the gear-shaft bearings for end-play. A sleeve bearing so badly worn that the shaft wobbles results in noisy operation and rapid wear of the gears. Replacement shafts of slightly oversize diameter are available for most of the older projectors. The intermediate shaft for Simplex Regular and Super Simplex heads, for example, is available in five oversize diameters as well as in the standard diameter. A set of cylindrical male feeler gauges is useful for determining the exact diameter of shaft needed for a worn bearing.

Occasionally check the tightness of the set-screws in bearing collars to make sure that they have not loosened. The screws in the shutter-shaft collars of old-style mechanisms are especially liable to work loose.

## Tilted Screens?

REGARDLESS of recommendations issued by the Motion-Picture Research Council (IP for May 1957, p. 7 *ff.*), the tilting of screens in theatres having steep projection angles—angles greater than 15 degrees—is an expedient which should be considered with caution. The "cure" is sometimes worse than the "disease."

The effects of projection angle, as every projectionist knows, is an *elongation* of the vertical dimension of the image (tall, thin actors) together with "keystoning." The keystone, or trapezoidal, shape of the picture results from an increase in picture-width toward the bottom of the screen with a characteristic convergence of vertical lines toward the top.

Tilting the screen so that it faces the projection beam more squarely does indeed minimize the distortions of image-elongation and keystoning, but it unfortunately creates "viewing distortions" which are especially annoying to patrons in the side seats.

"The effects of steep projection angles can be reduced somewhat," wrote E. O. Kollmorgen in Motiograph's *Sound Track Book of the Theatre*, "by tipping the screen backward, but the effect anywhere but in the center of the house is usually so grotesque that elongation and keystoning are preferable."

This point of view was expressed by IP as long ago as October 1947 (p. 9) when we cautioned against a screen tilt much in excess of 5 degrees. Now that quarters are advising us projectionists to tilt our screens, we find it refreshing to turn back to the standards and practices of former years.

### New 16-mm Editing Design

A new 16-mm editing machine using a new type of intermittent sprocket movement which gives an unusually quick pull-down has been introduced by John A. Maurer, president of JM Developments, Inc. Shown to members of the SMPTE, the machine projects a bright high quality 6 x 8 inch image of the picture. The image includes the top and bottom frame lines, inner edges of the sprocket holes and the sound track. If only the normal picture area is desired, a mask is provided for that.

The apparatus can operate in speeds from very slow to twice normal projection speed. Quick stopping is provided for, as well as stopping, reversal of direction and manual frame by frame operation.

Sound is reproduced from a separate film with either a photographic or magnetic record, provision being made for reproducing in sync, a sound track on the same film with the picture so that the machine may be used for the inspection of prints, as well as for editing.

# News and Views from District No. 2

By HANK BOLDIZSAR

Member, IA Local 150, Los Angeles, Calif.

*This month our West Coast columnist reports on the highlights of a recent California District meeting.*

DISTRICT No. 2, which is comprised of 24 theatrical Locals in Calif., Ariz., and Nev., held its second meeting of the year on May 21 at Kit's Palomino restaurant in Oxnard. On hand to welcome the delegates and guests were Brothers McCabe and Venema of Local 709, Ventura County. Council President Billy Wise (business representative for San Diego Local 297), assisted by Council Secretary Lon Bennett (Long Beach Local 521), presided at the meeting.

Following roll call, during which the answering delegates introduced their guests, President Wise obligated two new members to the Council — Leo Moore and Don V. Kloepfel, newly elected officials of Hollywood Local 165. George Schaffer, business representative for Los Angeles Local 150, introduced his guests—Wallace G. Crowley, Charles Y. Crowe, Joe Pylet, Guy A. Bride, and, of course, your truly. Our sister Local, Hollywood 165, was well represented by Al Pullen, George Flaherty, Leo Moore, Don Kloepfel, and Freddy Beard. Carl Cooper, IA second vice-president, was among the invited guests.

Among the several interesting letters from absentee members read at the meeting was one from Johnny Gotchel, secretary of Santa Barbara Local 442, who has been hospitalized for quite a spell. Johnny's wonderful sense of humor hasn't in the least been dimmed by his illness nor has his regard for the "ladies."

### Copper Drippings Program

A letter from yours truly telling about Local 150's Memorial Copper Fund was also read, whereupon I was invited to address the assembly. I gave the delegates a brief outline of the Local's activities on this project, and informed them that since its inception last January we have netted approximately $125 each month from the sale of copper drippings collected by the members, the proceeds of which have been donated to the Will Rogers Memorial Hospital.

Incidentally, this copper drippings program originated with the New York 25-30 Club and was brought to our attention by Boris Medove, member of the Club. Nels Matheson, coordinator of the Local 150 Memorial Copper Fund, has prepared a leaflet explaining the purpose of this Fund and the methods employed by our Local members in collecting the drippings. Copies of this leaflet may be obtained from Local 150, 1800 South Vermont St., Los Angeles 6. Calif.

### Report on New Contracts

Many of the delegates reported on current activities of their Locals. Ralph Adams, business representative for Local 504, Santa Ana, reported the acceptance of new contracts at Disneyland calling for a wage scale of $3.56 per hour for a seven-hour shift, with the employer (Wm. Ralke Co.) contributing 6¢ per hour to the Local's welfare fund. New two-year contracts providing for a 10¢ per hour wage increase the first year and an additional 15¢ per hour increase the second year was announced by Harry Reynolds of San Bernardino Local 577. In addition to the wage hike the employers agreed to a contribution of 50¢ per shift to the Local's welfare fund.

George Flaherty, IA representative and president of Hollywood Local 165, informed the delegates that TV station KTIA, Hollywood, now has complete IA representation, with the exception of its office workers, and is part of our Radio and Television Department.

### Mobile Projection Room

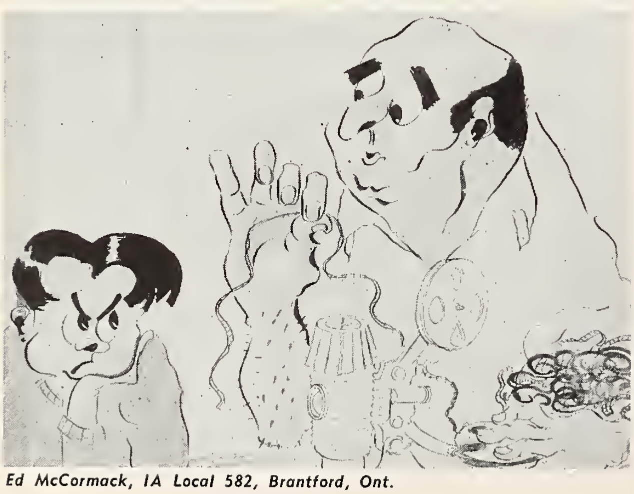
Harry Reynolds (Local 577) informed the delegates of an unusual situation involving a newly-constructed drive-in theatre in the Big Bear Lake area — a Southern California mountain resort. Although the drive-in was completed without a projection room, this did not stump the exhibitor. He had the projection equipment removed from one of his "hard tops" and installed it on a war surplus truck he had purchased for conversion to a mobile projection room. His plan was to use this unique projection room in Big Bear during the summer season and in the valley the remainder of the year. This would completely disregard the health and sanitary provisions under the existing local and state laws with regard to motion picture theatre projection rooms.

The Council requested Clem Marchand, who was appointed by California Governor Goodwin Knight to represent Labor on the Governor's Committee for Industrial Safety, to investigate the matter. A member of Local 150, Clem's work on the Industrial Hygiene Sub-Committee has been of inestimable value to many Locals in Southern California that had to contend with bad sanitary and ventilation conditions in projection rooms within their jurisdiction. It is a foregone conclusion that with Clem on the investigating end the Big Bear situation will soon be corrected.

Those "genial gents" from Disneyland, Brothers Ralph Adams, Council veep and business representative for Santa Ana Local 504, and Frank Smith, Hemet Local 707 president, were very much in evidence at the meeting adding to the friendly atmosphere that marks each District Council gathering. Ralph was scheduled to enter the hospital for surgery the day after the meeting—he told me that he was planning a vacation in Las Vegas and wanted to make sure he would be in tip-top shape. I heard of Las Vegas vacations but never realized that such extensive preparations were required. For myself—I think I'll take Hamtramyck.

Brother Flaherty announced that the

OH, THE IGNOMINY OF IT ALL!!



Ed McCormack, IA Local 582, Brantford, Ont.

"Why Son!—You know I'm strictly a 'Todd AO' specialist."

# Projectionist License Exam Questions

NO $64,000 for correct answers to the following questions, but if you hadn't answered them correctly when they appeared on a recent official projectionist license examination, you'd have gone home empty-handed also. House rules require 75 per cent correct for passing, and no peeking at the correct answers on page 27.

*1. The speed of the synchronous motor drive on your machine may be increased by:*

(a) connecting resistance in series with the rotor; (b) connecting resistance in series with the stator; (c) reducing the line voltage, (d) changing the frequency of the supply if possible.

*2. The rating of a link fuse as stamped upon it, should be:*

(a) 70 per cent of its true rating; (b) 80 per cent of its true rating; (c) 90 per cent of its true rating; (d) 100 per cent of its true rating.

*3. In using the water test for determining the positive leg of a 2-wire DC system, the positive leg will be the one where:*

(a) most bubbles of gas are formed; (b) least bubbles of gas are formed; (c) nothing happens at all; (d) the solution changes color.

*4. The motors of the ventilation fans in the ladies' and men's lounge must be connected to:*

(a) the emergency service; (b) the booth vent motor circuit; (c) any appropriate circuit; (d) the manager's office circuit only.

*5. The maximum number of feet of film which may be kept, stored and handled in a projection room at any one time is:*

(a) 100,000; (b) 75,000 (c) 65,000, (d) 50,000.

*6. The maximum number of feet of film which may be kept in a fire-proof rewind room is:*

(a) 5,000; (b) 10,000; (c) 15,000, (d) 20,000.

*7. The maximum number of feet of film which may be stored in an approved film cabinet at any one time is:*

(a) 15,000; (b) 25,000; (c) 10,000; (d) 50,000.

*8. A plug fuse may be used on:*

(a) a 120-volt circuit; (b) a 220-volt circuit; (c) any DC circuit only, (d) any AC circuit only.

*9. When the electrical feed for a motion picture theatre originates at the low side of a transformer mounted on a pole and then continues to the building and down through a standpipe into the building to the meter cabinet, we would say that the lighting company is supplying current to the theatre with:*

(a) DC; (b) AC; (c) an overhead service, (d) an underground service.

*10. In order to correct a lens for chromatic and spherical aberration, the lens should be:*

(a) made of colored glass; (b) made up of several lenses which have negative and positive curvatures and are composed of different types of glass; (c) made larger in diameter and only the center area used, (d) mounted in a barrel which contains suitable filters.

*11. After a gas becomes ionized it:*

(a) liquefies; (b) evaporates; (c) becomes a conductor of electricity, (d) becomes a non-conductor of electricity.

*12. The fuse blows every time you strike the arc. The lamphouse is wired up correctly. The trouble will most probably be found in the:*

(a) lamphouse; (b) table switch; (c) mains, (d) rheostat.

*13. A certain vacuum tube has a heater, a cathode, a grid and a plate. This tube is:*

(a) a photo-electric cell; (b) an exciter lamp; (c) an amplifier tube, (d) a rectifier tube.

*14. Slow fluctuations in motor drive speed will create the condition called:*

(a) wows; (b) flutter; (c) variability, (d) flicker.

*15. The resistance in ohms of a circular mil foot of copper wire is:*

(a) 5.4; (b) 10.8; (c) 15.0; (d) 21.5.

*16. Of the following currents, the one which will cause a #6 B and S asbestos insulated wire to become most heated is:*

(a) 1 ampere at 1000 volts; (b) 10 amperes at 100 volts; (c) 25 amperes at 40 volts; (d) 50 amperes at 20 volts.

*17. In good operating practice, certain parts of the machine should be oiled daily while the intermittent oil well should be drained and filled with fresh oil at the end of each:*

(a) 24 hours; (b) 100 hours;; (c) 500 hours, (d) 1000 hours.

*18. After running the projector all day, your manager gives you a brand new reel. This new film breaks several times while you are projecting it. The cause for this most probably is:*

(a) emulsion coming off and adhering to tension shoes; (b) too thick film; (c) careless operation of the projector, (d) too fast operation of the projector.

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District 2 convention will be held in Oakland, Calif., September 14-15.

### Foreign-Made Films

Foreign-made films seem to be a thorn in the side of Hollywood production. Albert K. Erickson, Local 727 (Motion Picture Crafts Services) reported that foreign-made films were a contributing factor to Hollywood's present unemployment situation. He denounced the tactics of a certain popular columnist and TV star who consistently advertises these films, and voiced the opinion that this video gent should be induced to save his plaudits for the products of our own industry.

In a recent "toss-away" publication, I noticed an item by a gentleman who enjoys a considerable amount of popularity on both radio and TV as a predictor of "things to come," in which he states that no pictures will be made abroad by American producers after January, 1958. The new trend, according to his prediction, is for each foreign country to impose a 5 to 25 per cent tax on the gross of a picture. figured on a world wide basis. If this doesn't drive U. S. runaway production back home then nothing will.

I was recently visited at the theatre where I work by a lad from Missouri who claimed to have worked as a motion picture projectionist for the past 13 years in Missouri, Texas, and Florida. He is not an IA man but is a member in good standing in a UAW Local in Missouri. Like many visitors to this part of the country he declared himself to be ready, willing, and able (?) to take a permanent job as a projectionist, preferably, if you please, in one of the Hollywood studios (a real corn-ball, this lad).

In relating his experiences as a non-IA projectionist, he told me that his last job was in Florida where he worked in a theatre seven days a week from 2 p. m. until midnight for $50 per week. In addition to his work in the projection room, he was also required to do the janitor work in the theatre auditorium.

Somehow I had been under the impression that such conditions ceased to exist about the time the Stanley Steamer conceded defeat to the gasoline buggy. This month when I pay my dues to our Local secretary, I think I'll toss in an extra 10% with a prayer of thanks for the IATSE and for what it represents to those of us who seek our livelihood in the entertainment industry. Units that are not yet organized might do well to review the benefits that organized labor has to offer.

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### Bodde Three In A Row

This year marks the third consecutive time that Academy Award entries have been viewed on a Bodde Seamless Screen, the company announces. All award-seekers were judged on the white platinum seamless installation. Measuring 21 feet by 58 feet, 6 inches, the screen is the same type used at the Cathay Circle for "80 Days."

# Do You Really Know Your Arc Operation?

**By LOU WALTERS**

**IA Local 249, Dallas, Texas**

*(The question is not idly put. Our serviceman-projectionist veteran puts forth some timely points on a subject ordinarily considered left-hand knowledge. But things are seldom what they seem.)*

This month we would like to discuss what is not necessarily an overly familiar subject: the arc and its related equipment—generator or rectifier, and carbons.

Perhaps not so strange is that fact that the bulk of reports from factory representatives of lamp and carbon manufacturers indicate a projectionist lack of knowledge with respect to proper arc voltage and matched carbon sets. The special problems brought on by today's wide screen demand that each projectionist do his utmost in keeping equipment properly adjusted, following, of course, company recommendations for carbon sizes and necessary voltage at the arc.

Those recommendations are the most abused and least thought of requirements for a smooth burning arc. When the arc is not properly adjusted, both voltage-wise and mechanically, obviously the economy of the carbon suffers.

### *Follow Recommended Sizes*

It should be the number one charge of the projectionist to check into the available information from his supply house, or inquire from his equipment manufacturer the maximum and minimum voltage—subject to carbon size—necessary for the most economical setting. Sometimes the difference of a couple of volts can amount to considerable saving of carbon, resulting in better light and a smoother burning arc, not to mention saving the projectionist the task of constantly watching the arc.

There is always the chance of something causing a sudden change in operations. For example, everything may be working properly, and still the ammeter will show an unsteady arc, with the amps jumping to double the normal amperage. In this case, you can readily assume a poor contact with the carbon. This happens often with the rotating type of lamphouse set-up where the contacts have been damaged, or have not been replaced or cleaned recently. It is good practice to use a brass spiral brush on these contacts each day before starting the show. Such a brush serves two purposes: (1) to clean, and (2) to keep the bearing surfaces of the nickel contacts polished. These contacts are quite expensive and should have careful attention to prolong their life and remain trouble-free.

Another point I would like to comment on is that carbon manufacturers have gone through exhaustive tests to determine the best size combinations, and recommended combinations should not be deviated from. If—as I have found in many projection rooms—larger negative carbons are used, other than the recommended size, then it is apparent that the equipment is not propertly adjusted. Or the individual doing this assumes that he knows more than a group of engineers that have put in countless hours studying and experimenting with all phases and possibilities to better their product.

One important working tool is the DC voltmeter. This does not have to be an expensive test set, but a small meter of good quality should be used occasionally to check the lamp voltage. Several things can change this voltage—dirty and worn commutators on the generator, poor tube contact on the rectifiers, bad wire connections, or corroded terminals. And do not overlook the possibility of poor contacts on both positive and negative holders in the lamphouse. Also, the knife switch should be cleaned, and a light coat of grease put on the blade contacts.

Do not hesitate to demand of your supply house or equipment manufacturers any instruction books you might have misplaced. Once you have them, refer to the contents often. It will assist you in doing a better job and being a better projectionist. After all, your job is to project the picture on the screen at its best, and you are expected to do this without exception.

My old friend P. A. McGuire originated the phrase: "Better projection pays." Mac should know, having spent an active lifetime as good-will ambassador for International Projector Corp. If he could help the projectionists with their problems, he would, acting on the sound theory that by improving the projection craft, it follows that the box office should also improve.

# IP LETTERS TO THE EDITOR

[ED. NOTE: We have received a number of film samples in the mail lately, either by way of complaint or suggestion. We'd like to pass these prints around, but since we can't, we feel that the following letters are self-explanatory enough.]

## Negative Patch

*To the Editor of IP:*

You are so right about curved patches. We find a negative patch, not a hairline, goes through with less noise and less jump on the screen, and holds better than a hole-over-hole.

Also note the CinemaScope sample that is printed out of frame. We get them every once in a while, and must frame when these patches go through.

HERMAN POLIES

Dover, Del.

## Scotched Perforation Holes

*To the Editor of IP:*

Enclosed is a short piece of film which I find quite effective in relation to your recent article on notching perforation holes.

I recently received this print in a dished can, and from which the reels had to be extracted with pliers. Upon examination of this print, the perforation holes were broken, some very close together. Instead of splicing too close together, I used Scotch tape on the side of the perforation margins and I find this quite effective. This will not loosen even under severe arc temperatures.

However, if these broken perforations had been spliced, portions of musical continuity would have been eliminated from the subject.

I feel that I should like to pass this information along to your magazine in the hope it may act as an aid to other projectionists experiencing the same difficulty.

JOHN F. RODGERS

O'Brien Theatre
Renfrew, Ont., Canada

## Dark Leaders

*To the Editor of IP:*

The enclosed leader is from an RKO picture, "Bundle of Joy," which I ran recently. All reels had the same dark identification leaders. If this were the first instance, I would not think too much of it. But as a projectionist who works 30 or 40 different houses a year, I run into this type of thing too much. In this particular instance I relieved the regular man at 6:30 and ran this picture twice during the evening. At no time was I ever sure that I had the right reel in the incoming projector. If they had been misplaced in the bins, I would have had a very embarrassing shutdown.

I am addressing this complaint to you because I feel that your voice would carry sufficient weight to have this condition corrected. I don't like having to play guessing games when it comes to placing the proper reel in the machine.

I know the obvious thing would be for

the regular man to clearly label or paint the leaders the reel number, but a lot of them don't, and my position as guest projectionist for the night does not permit me or give me the time to do so. Often there is nothing in the booth to accomplish this with.

Thank you for listening to me. I hope you will be able to do something to correct this condition which is handicapping the already over-burdened projectionist in his efforts to do a creditable job.

Ray Green

San Francisco, Calif.

### A Note of Appreciation

*To the Editor of IP*:

Many thanks for the continued excellence of *International Projectionist*—the Bible to us humble projectionists. The articles by Robert A. Mitchell are indeed grand, and I look forward to receiving his MANUAL OF PRACTICAL PROJECTION which I have ordered through your Australian agent (McGill's). Projectionists' problems seem to be the same the world over and your publication is truly international in every sense of the world.

Keep up the good work and my sincere thanks to you for the valued information always coming to hand.

Reg. A. Stewart

Wangaratta, Australia

## OBITUARIES

Castrucci, Augustine, 65, member of Toronto Local 173, died suddenly on June 12. He was a member of the Famous Players 25-Year Club and was highly esteemed by his fellow workers.

• • •

Ricord, Sr., Willard C., 68, member of Hollwood Local 165, died of a heart attack on June 18. He was chief projectionist at the Fox West Coast screening room. He is survived by his wife, son, and two grandchildren.

• • •

Moriarity, Maurice, veteran member and former official of Local 273, New Haven, Conn., died recently in Tampa, Fla., where he had been living following his retirement early this year. He was buried from his home town, West Haven, Conn., on Saturday May 25. Survivors are his wife and foster son.

• • •

Foster, R. J. 65, member of Vancouver Local 348, died several weeks ago. Born in England, he moved to Vancouver in 1912, becoming a member of Local 348 several years later. He was a staunch unionist and served the Local in various official capacities. His wife survives him.

### Answers to Projectionist Exam

| | | |
|---|---|---|
| 1. D | 7. B | 13. C |
| 2. B | 8. A | 14. A |
| 3. B | 9. C | 15. B |
| 4. C | 10. B | 16. D |
| 5. D | 11. C | 17. B |
| 6. B | 12. D | 18. A |

## STEREOPHONIC SOUND

(*Continued from page* 18)

scope and a wide frequency range meter.

*Experiment 6a.* A set of readings was recorded on the meter for various sine wave frequencies.

*Experiment 6b.* A block of sound-absorbing material approximately the same size as a human head, was suspended directly in front of the microphone. The results are shown in Table I.

### TABLE 1

| Frequency, cps | Difference in reodings, db |
|---|---|
| 100 | – 3 |
| 200 | – 3 |
| 300 | – 3 |
| 500 | – 3½ |
| 1000 | – 7 |
| 3000 | – 8 |
| 5000 | – 10 |
| 8000 | – 7 |

It must be noted that this experiment included as error the acoustics of the room and the acoustic relationship between the shadowing device distance to microphone and others. The result showed that shadowing occurs in higher frequency (function of size of shadowing device).

*Experiment 7.* The same apparatus was used as in 6, but the signal used was a square wave, rich in harmonics. The signal picked up by the microphone was viewed on the oscilloscope. When the artificial head was suspended in front of the microphone, the wave form approached sine wave shape, the fundamental frequency. If the fundamental were below 800 cps the amplitude of the fundamental was relatively unattenuated but the wave form was almost completely stripped of harmonics. Again, the room reflections introduce error.

*Experiment 8.* This experiment constituted the ultimate test of the theory. Two identical reproducers were mounted fixed and equidistant from the subjects' ears and in a line normal to the side of the head. The loudspeakers were in phase and connected to the same signal source, and in this case the signal was music.

The signal reaching the subjects' inner ears was exactly the same for each side except that a frequency discriminating network was introduced in the circuits so that at 800 cps attenuation began and continued at approximately 4 db per octave.

The control was flexible and the attenuation could be smoothly decreased in one and increased in the other. The reproduction of frequencies below 800 cps remained equal for both speakers. With the control at the mid-point the frequency response of the two speakers was the same. This result was noted: when the control was moved from one extreme to the other the subjects reported an illusion of the artist moving from one side of the stage to the other. There was no effect of the sound being "louder on one side than the other."

### *Accuracy Maintained*

The subjects were able to indicate precisely where the artist stood in an arc of 180 deg. in front. Settings of the control were recorded and related to the imagined location of the artist. On repeated tests the subjects maintained a high degree of accuracy in orienting the imagined performer with respect to the control settings. Further, the subject noticed no blank space in between the extremes of left and right. The same degree of accuracy in orienting was maintained with this artificial head shadowing experiment as was found when an actual sound source of complex wave form moved about the subject.

Probably the simplest and most dramatic experiments that disprove the current theories (phase and transient theories) is that a person with one deaf ear or one ear completely closed off *can* orient to a surprisingly high degree. Information about the position of the source can be obtained by moving the head slightly.

A person is able to remember a tone quality or wave shape of a sound for a certain period. By moving his head he can compare the wave shapes received at different times and from different angles and from these samples, decide on the position of the source, even though he is using only one ear to gather the information.

If, on the other hand, phase or transient timing were measured by the brain, the subject would need to take his tests of the signal from two points simultaneously. One can not store information about time in a way that would permit comparison of phase shift or arrival time.

The conclusions that may be drawn

## *Your Preference?*

**What would you like most to see covered in future issues of IP? We aim to please, and what YOU want to appear in the pages of this magazine is the most important thing to us. So, if there's a particular subject (or subjects—any number) on your mind, just fill in the lines below and return to us. We'll do the rest.**

INTERNATIONAL PROJECTIONIST, 19 West 44 St., New York 36, N. Y.

**Gentlemen: I would like to see published in IP articles (and drawings) relating to the following subjects:**

..........................................................................................

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..........................................................................................

..........................................................................................

NAME.................................... ADDRESS....................................

separate themselves into two categories. First, in order to orient accurately, the brain must be supplied with information concerning the amount by which the left and right ear signals deviate from a sine wave or pure tone for fundamental frequencies below 800 cps. The ear receiving the more nearly sine-wave signal is farther from the source. Since most of the power in a sound signal is found in the fundamental, for fundamentals under 800 cps no appreciable drop in effective volume is experienced through shadowing.

In the main, left-and-right orientation is provided by head shadowing while front-and-rear orientation by external ear shadowing. Every angle of the full 360 deg. about the head produces a slight difference in amount of these two filtering effects with maximum sensitivity occurring at 0 deg.

Conversely, to produce the effect of a difference in volume from one ear to another, the amplitude of the frequencies below 800 cps must be increased or decreased. It is this which has produced the unrealistic effects found in present day stereophonic techniques.

### *Practical Conclusion*

The second and more practical conclusion that may be drawn is that to improve realism only the upper frequencies should be picked up and delivered through different channels. In a stereophonic sound reinforcing system for example, there need be only one pickup, amplifying, and reproducing system for the frequencies below 800 cps and since most of the power requirements are in that range costly equipment need only be single channel. Only the high notes and harmonics should be reproduced by a dual channel system. Amplifiers and loudspeakers become less costly and easier to install when required to handle high frequencies only.

Important, too, is the fact that many of the noise components of electromechanically reproduced sounds such as emission noise, tape hiss, needle scratch, and so on, are at the high end of the frequency spectrum. When high frequencies are increased or decreased in the ear from time to time, the listener's attention is drawn to these noises. Therefore, care must be taken to achieve stereo realism, to use apparatus which is as near noiseless as possible. It is a problem which becomes more important with stereophonic reproduction than with dimensionless sound.

---

Average U. S. Company dependent upon technological developments should spend about 5% of its sales for research if it is to keep up with competition, according to Dr. Haldon A. Leedy, director of Armour Research Foundation.

## FILM STANDARDS FOR PICTURE AND SOUND

(*Continued from page 13*)

The answer to anamorphic troubles is to be found, not in optical reduction of fine-grain negative images, but in the characteristics of color processing and anamorphic optical systems. The lens, not the film, is the limiting factor. And while fully corrected anamorphots of the cylindrical-lens type are available, it is interesting to note that Technicolor, in collaboration with the Italian projector firm of Microtecnica, chose the simpler mirror anamorphots of the Delrama type when devising the Technirama wide-frame system.

The Technirama process evidences a recognition of the true state of affairs in regard to anamorphic image definition. A horizontally running 35-mm film with an 8-hole pulldown is utilized in Technirama. But unlike VistaVision, the image is compressed by an anamorphic factor of 1½. The positive horizontal print has the soundtrack at the top of the picture area, and employs a projector aperture measuring 1.421″ x 0.818″ for an aspect ratio on the screen of 2.55/1. Standard vertical 35-mm "unsqueezed" prints can be made from Technirama negatives.

### *Technirama Premiere*

Technirama had its première at the Reposi Theatre in Turin last year with the showing of Marlene Dietrich's "Monte Carlo." Image definition was excellent, being sharp from edge to edge. Although it is difficult to see any advantages in Technirama when conventional 35-mm *imbibition* color prints are made from the anamorphic large-frame negatives, several European producers were sufficiently impressed by it to select it for future production work.

[Ed. Note: *There are also a number of American Technirama features now in production. Such studios as Batjac, U-I, RKO, and Walt Disney are utilizing the process.*]

The imbibition dye-transfer process of printing release positives in full color suffers from registration troubles and "bleeding" of the dye images, particularly the image printed in magenta. The magenta image, unfortunately, is the visually critical one, as it represents the green primary record photographed by the camera.

This process, the heart and soul of Technicolor, has been improved in recent years, and is undergoing continued improvement for sharper dye images. It is therefore entirely possible that this comparatively inexpensive process for commercial motion pictures in color will resume its former rôle as the chief method of color release printing in the near future. Technicolor imbibition prints, when made from Technicolor separation negatives, have always been characterized by excellent, well-balanced color rendition.

The use of wide film for projection has always had its advocates. The most important pre-Todd attempts were Paramount's 56-mm and 65-mm Magnifilm (1929), the Spoor-Fox 70-mm Grandeur process (1929—1930), and the 65-mm films used in 1930 by Warner Brothers and MGM. A few pictures were released in all these sizes; and all except "Happy Days" were also released in standard 35-mm form to the rank and file of theatres.

### *Fox Grandeur Film*

Fox Grandeur film (Fig. 7) was issued with one rather wide optical soundtrack and "5-hole" frames measuring 2.15″ x 0.90″ (about the size of present-day Todd-AO frames). This film ran at 90 feet per minute, resulting in 19½ frames per second, for the "Happy Days" presentation in 1929. Other film sizes used during the early sound period had widths of 46 mm, 52 mm, and 63 mm.

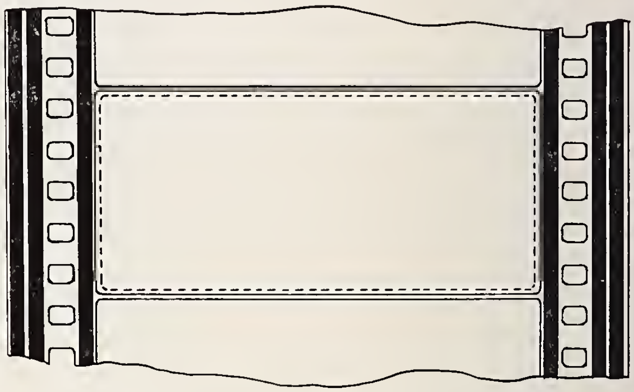

FIG. 8. 70-mm Todd-AO film with normal perforations, but wider-than-normal perforation margins. 5 perforations per frame; running speed 140 ft. per min., 30 frames per sec. Camera aperture, 2.07″ x 0.91″; projector aperture, 1.913″ x 0.866″ (aspect ratio 2.2/1.). six 0.059″ magnetic soundtracks, 2 outside and 1 inside the perforations on each side.

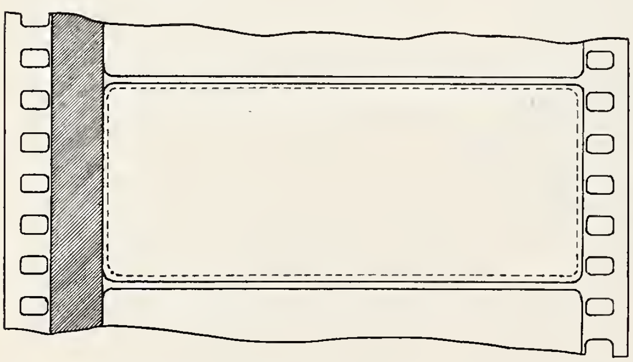

FIG. 7. 70-mm Grandeur film with normal perforations, but one frame per 5 sprocket holes instead of 4. Running speed 90 ft. per min., 19½ frames per sec. Camera aperture, 2.15″ x 0.90″; projector aperture, 2.00″ x 0.87″ (aspect ratio 2.3/1). Optical track 0.225″ wide.

Todd-AO film (Fig. 8) resembles Grandeur except in the matter of soundtracks and film speed. Todd-AO employs six magnetic tracks for full stereophonic sound and 2.07″ x 0.91″ frames on 70-mm film which runs at the rate of 30 frames per second to decrease peripheral ("corner-of-the-eye" vision) flicker, which is apt to be troublesome on wide screens when the frame rate is only 24 per second.

CinemaScope versions of Todd-AO productions are made by dual filming with a standard 24-frame/second cameras, hence reduction prints are not made from the 65- or 70-mm originals.

Image definition in non-anamorphic Todd-AO projection is superb, yet certain intrinsic defects of the process were noted during the première screening of "Oklahoma!" in October 1955. These included geometric distortions caused by the combination of deep screen curvature and steep projection angle. (This defect was later minimized by building a special projection booth on a lower balcony.) The rug-

gedly constructed projectors built by Philips of Eindhoven provided a rock-steady image on the 54-foot curved screen of 2.2/1 aspect ratio.

### *Questionable Practice*

The use of screens wider than 30 or 40 feet in indoor theatres for "everyday movies" is questionable practice, although doubtless a powerful attraction in the case of special presentations of roadshow caliber, such as "Around the World in Eighty Days." Unless *exceedingly large* "audience-enveloping" screens are used, requiring wider-than-standard images *on the film*, the use of 55-, 65-, and 70-mm projection prints offers no advantage of striking importance.

The reason for this conclusion is simply the fact that the photographic possibilities of the conventional 35-mm print frame have seldom been fully utilized. To repeat: the limitations of the standard 35-mm projection process *on screens under 40 feet wide* are the limitations of lenses and photographic processing.

Modern projection lenses are marvels of optical technology, yet few measure up to the standards of the finest camera lenses, and none reach the actual physical limitations of emulsion graininess in release-print *positive* stock. And only the better projection lenses are limited in their image-producing performance by the grain of fine-grain *negative* emulsion which has been given fine-grain development.

The resolving power of most projection lenses is appreciably greater in the center of the field than it is at the extreme side or edges. Off-center resolution has been greatly improved by modern lens design, which represents a distinct advance over the older Petzval design. True, there are vast differences in resolving power even among modern lenses when different makes and focal lengths are tested; and if resolution *at a point halfway between the center of the aperture and one of its corners* is considered, we find that some lenses can resolve (project clearly upon the screen) as many as 100 lines per millimeter on the film, while others can do no better than 20 or 25 lines per mm.

### *Resolving Power*

But what is the resolving power of film? To phrase the question another way, how many clearly defined lines per millimeter can be developed in the different color and black-and-white emulsions?

Black-and-white positive stock and the similar type of film used for sound recording have the highest degree of photographic resolution—from 200 to 1,000 lines per mm. Multilayer dye-coupler positive-print film ranges from about 60 lines/mm to 100 lines/mm, depending largely upon the fineness of the red-sensitive emulsion. Negative emulsions, on the other hand, vary from 50 to 60 lines/mm in the case of multilayer color stock to approximately 100 lines/mm for fast fine-grain panchromatic emulsion.

There are coarser and finer negative emulsions, of course; but those mentioned are the ones most frequently used in professional moviemaking.

The final composite resolving power of a 35-mm motion-picture print depends upon the performance of the camera lenses and the quality of the

duplication work as well as upon the individual resolutions of the films employed. Image definition is lost with each printing; and when this work is done carelessly, resolution *on the print* may be equivalent to as little as 15 lines/mm for black-and-white or 10 lines/mm for imbibition color. Images as fuzzy as this are fortunately very rare, but the highest possible resolutions are nevertheless infrequent.

A degree of photographic resolution approaching 60—70 lines/mm for black-and-white second-generation contact prints, and 35—45 lines/mm for final color prints, is not only possible, but actually quite feasible, thus making standard 35-mm projection sufficiently sharp to be indistinguishable from wide-film projection on screens up to about 40 feet in width. It has been determined that a resolution of 30 lines/mm on 35-mm film gives a picture that appears sharp even when viewed from the front row of seats in the average theatre.

But suppose we aim at a minimum of 40 lines/mm in the interest of excessively wide screens, such as those in drive-in theatres? This goal is not impractical. It is advantageous to the industry from every sane point of view. It can be tested—checked and double-checked on every reel of film, if necessary.

### Biggest Problem

The biggest problem in 35-mm projection when the screen exceeds 40 feet in width would then be solely an illumination and heat problem; but there is a simple remedy for that, too. Prints intended for the larger drive-ins should be "repeat-frame" printed (that is, each frame should be printed twice in succession) and the film played at 180 feet per second, which is double the regular speed. Sound reproduction would also benefit, for a level output from optical tracks up to 16,000 cycles would automatically obtain.

There is no point whatever in employing a large-frame negative only to lose its advantages by sloppy processing or an inherently blurry color-printing process for making the reduction prints. Nor is it reasonable to employ large-frame photography when the final result on the theatre screen is a mere doubtful improvement. A method of photography such as VistaVision or Technirama has a smaller field depth than standard movie photography, hence gives blurrier backgrounds in closeups and medium shots. These processes require more careful handling on the 35-mm printing end to make all their advantages visible on screen and the price of their disadvantages worth paying.

Having examined the tremendous and practically untapped possibilities of *normal* motion-picture photography, optical sound recording, film duplication, and positive printing, this writer is completely convinced that the standard 35-mm release print may justifiably remain the standard medium for theatre motion pictures.

There should be no more tampering with the dimensions of the perforations and image frames. Instead, effort should be applied to increasing the quality of optical soundtracks and improving image definition, both in color and black-and-white. And technical innovations, such as new methods of 3-D and stereophonic sound, should be tailored to conform to the specifications of the standard release print. It will be with us for a long, long time.

**[THE END]**

### GPE's Net Sales Up for 1957

General Precision Equipment Corporation's net sales for the first quarter of 1957 were about 33 per cent higher than for the first quarter of 1956, according to President Hermann G. Place. However, theatre equipment sales now account for less than 10 per cent of the company's total business, whereas in 1936 theatre equipment sales were its only business. National Theatre Supply and International Projector are among the GPE's subsidiaries.

### Loew's Nets $2,729,248

Loew's Inc. has announced a net profit of $2,729,248 for the 28 weeks ended March 14. This works out to 51 cents a share, as compared to the $1,889,843 net profit/36 cents a share take last year.

## TELECASTS

(*Continued from page* 19)

screen system has immediate application to closed-circuits.

The anamorphic lens designed by Rosin is also adaptable to motion picture camera use for coupling with prime lenses of 40-, 50-, 75-, and 100-mm focal lengths. By the insertion of two pins projecting from the camera lens mount into slots on the driving member of the Scanoptic lens, simultaneous focusing of both anamorphic and prime lens is accomplished by a single rotating motion.

### Magnetic Sound for TV

WIDESPREAD USE of magnetic sound for newsreel and feature films is expected in the TV industry. Announcements by the two major companies in TV indicate a trend to exclusive use of magnetic.

RCA has now made available magnetic sound conversion kits for TV projection, particularly for their TP6 and TP16 projectors. CBS has adopted pre-striped magnetic sound on 16-mm film for its news programs.

Since news events happen anywhere and at any time, speed of processing is therefore of paramount importance. This previously influenced CBS in its choice of 16-mm film, and a single, rather than double, photographic sound system. But it is admitted that the quality of the product was nowhere near that of live programming.

In 1955, CBS began an engineering program to investigate the possibilities of pre-striped magnetic sound—application of magnetic material to the film before its exposure and development. Quality improvements and operational advantages were sufficient enough to cause the change to pre-striped magnetic.

Although complete use of magnetic sound is not yet a fact, the availability of equipment, and the improved reproduction would indicate that a major swing to magnetic is now in process.

### New GPL Monitors

GENERAL PRECISION Laboratory has announced a new line of video monitors that incorporate a number of advanced features. The units are designed to provide high definition pictures for both broadcast and closed-circuit systems.

Horizontal resolution of all models is in excess of 600 lines, video bandwidth is flat to 8 mc $\pm 2$ db. Aluminized kinescope tubes in the 14-, 17-, and 21-inch units have 70° deflection systems, and the 24-and 27-inch, 90° systems.

Designed for continuous duty operation with minimum maintenance, the monitors are constructed in both cabinet and rack mounted versions. Covers or front panels of each unit are easily removable for cleaning picture tube face and servicing.

A lightweight, wrap-around aluminum housing, and a 5° front panel tilt to reduce glare and reflection are features of the 17-inch model. The kinescope tube may be removed without disturbing the chassis, and operating controls are recessed for protection behind a hinged panel located below the screen.

### Basement Pay-TV?

METROPOLITAN LIFE Insurance Co. is reported interested in a basement-to-living-room closed circuit system for its 35,000 apartment buildings in seven cities. Initial demonstration was at the St. Regis Hotel in New York.

Hallmore Electronics division of Siegler Corp. set up the compact, self-contained studio which is equipped to handle 35-mm film, and modest live shows. Reportedly costing less than $15,000, the studio can be made ready to operate in one day. Installation of special receivers is estimated at $50 a set.

Although denying that any extensive preliminary engineering has been done in their housing projects, Metropolitan Life is reported to be conferring with International Telemeter Corp.

### Services Theatre by Radio

Altec service engineer James C. Hager, who is also a radio amateur ("ham") with a station in his own home, serviced the Morgan Theatre, Grundy, W. Va., by "ham" radio during a recent flood. In a triangular short-wave communication between Hager, another "ham" in the flooded community, and the manager of the theatre, symptoms of sound trouble were described and instructions transmitted, resulting in repair of the difficulty at long distance.

### New Technicolor Plant

Technicolor Companies have completed final plans and arrangements for their new plant which is to be built near their present Hollywood headquarters. Costing around $2,000,000, the establishment will house some 400 employees.

## VENTILATION METHODS

(*Continued from page* 16)

becomes that the projection staff will close off much or perhaps all of the "outside" air. What becomes of our ten-minute air change is somewhat obvious. Most buildings are not so filled with crevices that the required volume of air will infiltrate.

If we have proposed this oft-recurring problem, we must suggest a means to correct it. If the dirt is injurious to equipment, why not reduce its introduction to the projection room?

It follows that sufficient filtered air should be brought to the intake openings of the projection room. This air should be cooled or heated as the season may require, and should be independent of the auditorium system, where requirements are quite different.

### *Let Exhibitors Note*

If this seems to be an extreme measure, let the exhibitor consider the cost of lassitude caused by high projection room temperatures. Let him look at the lowered screen efficiency caused by the discomfort of the projection staff. And if he is the type exhibitor it has been the writer's good fortune to know, he will give thought to the "good business" practice of making the projectionist's cleaning task simpler, his working conditions more comfortable, and his health unimpaired by pulmonary congestion.



Granted then, that adequate and reliable ventilation fans have been provided; assumed further that the required amount of filtered and temperature-conditioned air has been provided for the room. If we obtain these rarely-encountered conditions, there remains one more step to be taken in order to keep a condition of steady-state equilibrium.

The exhaust point of the lamp exhaust fan must be so constructed as to provide for free rotation of the outlet in order that the fan will always have the help of any prevailing wind.

Turning this statement around, the reader will recognize the futility of attempting to obtain a positive updraft if the fan may be "bucked" by a wind which may cancel the impetus which the fan provides up the lamp exhaust stack.

The writer has referred in several places to the existence of State and municipal Codes which provide guides to basic and minimum ventilating requirements. Projectionists and union officials as individuals have a great stake in taking the message to persons in the proper places that the job is not even half done merely by providing fans of the capacity stipulated by codes. The writer can think of no one condition which offers so much opportunity for improvement in the projection field.

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### Motiograph Sales Increase

As a result of greater demand for motion picture sound and projection equipment, sales of Motiograph in May were the largest for any month since 1953. Greatest increase shown was in sales of the Motiograph AAA projector, double of those in any month of 1955 or 1956.

Marking its 61st anniversary of manufacturing 35-mm projectors, Motiograph has just purchased the COG Corp., which will operate as a division of the parent company manufacturing comminuting and spray blending equipment for industries.

The COG comminutor uses refinements of the hammermill principle. Made in stainless steel and utilizing exclusive "snap-apart" features, it is available to pharmaceutical, food, chemical, meat, plastic and all processing industries for dustless grinding or pulverizing of wet and dry materials. The easy-to-clean unit has variations to permit using it for continuous proportioning and thorough blending while maintaining accurate formula ratios of all ingredients, even on combinations of liquids and powders.

### B & L's New Division

Bausch & Lomb Optical Co. has announced creation of a new contract and defense products division, to be headed by Kenneth R. Reynolds, B & L engineer and current president of the American Society of Photogrammetry. The new division will handle specially-designed guided missile components and fire control systems for military and prime contractors; optical glass products for the motion picture producing and exhibiting industry including CinemaScope, Super-Cinephor and Baltar lenses; aerial and other photographic lenses, and photogrammetric equipment.

# INTERNATIONAL PROJECTIONIST






AUGUST 1957

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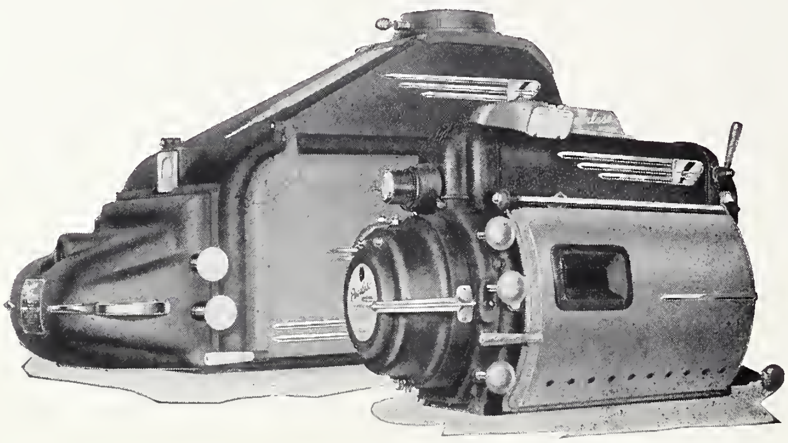

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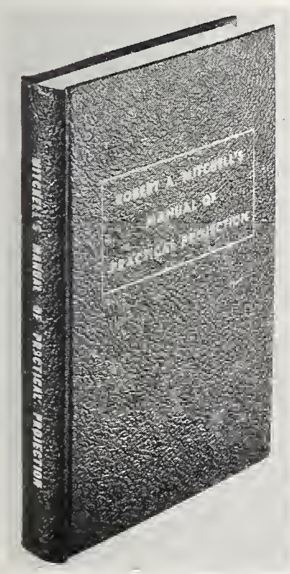


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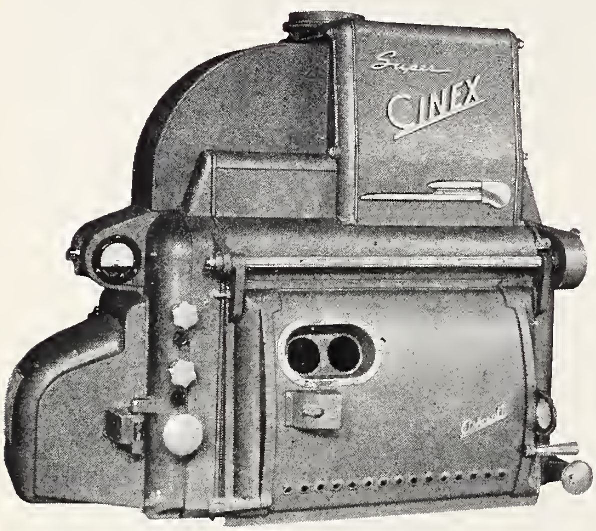


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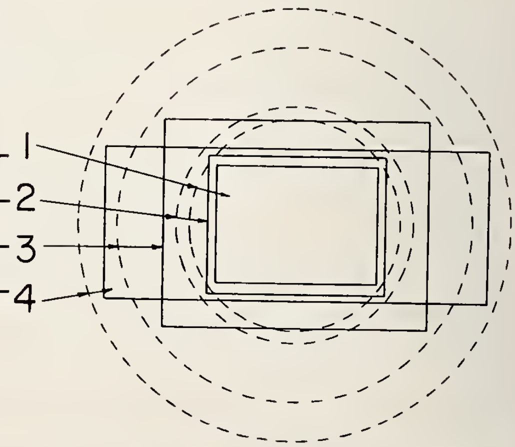


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# International PROJECTIONIST

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## Monthly Chat

### The Lost Audience

ALBERT SIDLINGER, the researcher, has made an honorable reputation as a compiler of statistics concerning the motion picture industry. These statistics, by and large, have tended to lean to the bright side, but that is Mr. Sidlinger's business—and it must be admitted that all those neat compilations of figures looked formidably solid enough to convince even the most skeptic. You can't argue with figures.

Or can you? Recently the Sidlinger office clashed with the Alfred Politz media studies (being surrounded by researchers is just a facet of this era) with regard to motion picture theatre attendance. Unbiased Politz maintains that during a certain week in February 23,600,000 patrons attended a motion picture. Unbiased Sidlinger just as stoutly maintains that Politz did not take into account: multiple admissions; children's admissions; drive-in admissions; free admissions. (And people like us who are authentic, inveterate movie-goers but who just happened to be sick that week.) His figure is 34,396,000.

These figures are impressively and carefully based on a breakdown of age, sex, annual household income, metropolitan versus non-metropolitan areas, and geographic regions. All very complete, or so it would seem.

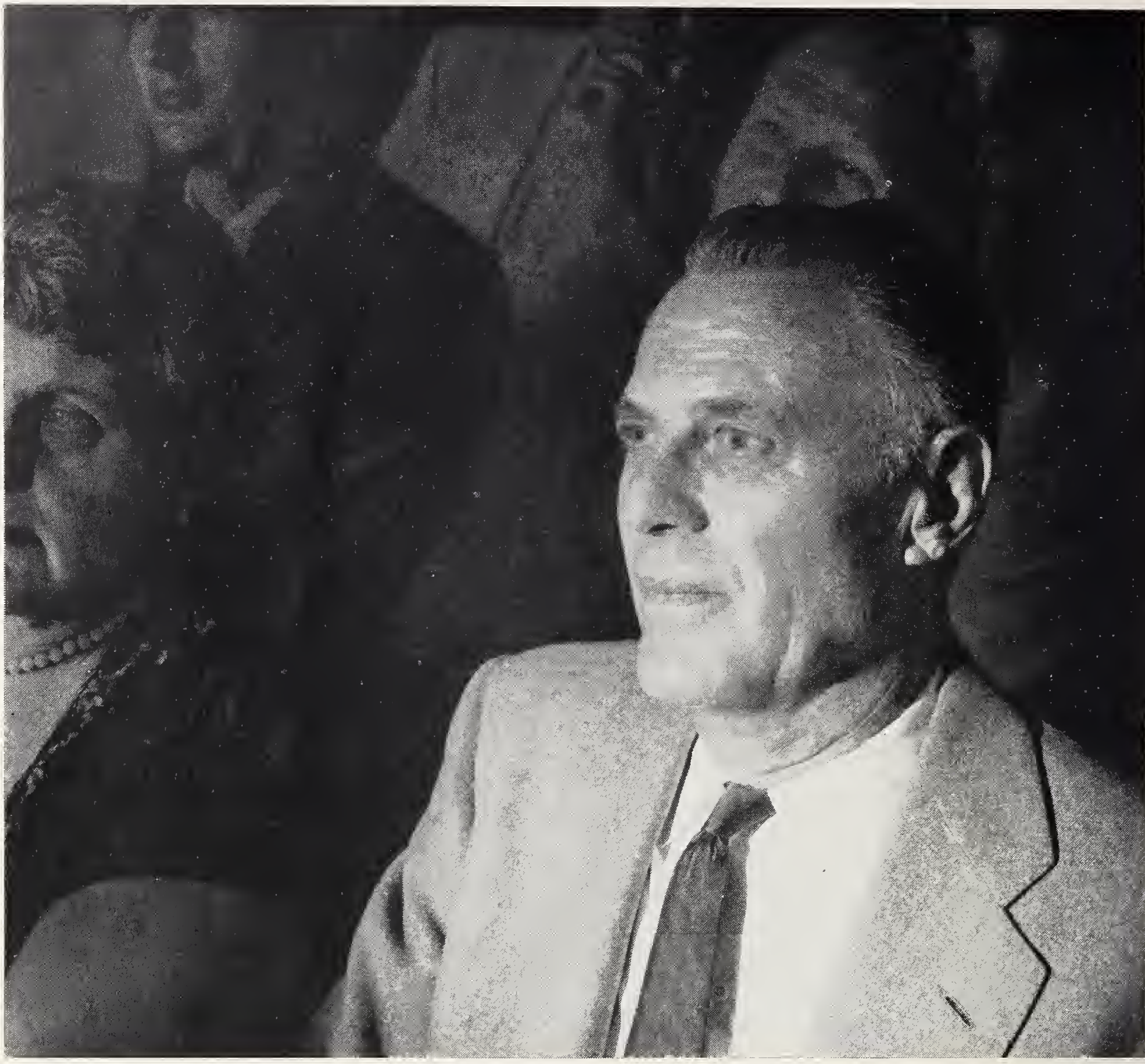
But we would like to propose a task for Mr. Sidlinger's well-equipped organization. We take no sides, except that of being in the technical country of this industry. But being there, we have seen the advent—or the onslaught—of technical innovation after technical innovation tumbling in on top of each other. Some of these have become casualties, happily so. Some have stayed on through novelty value, but inevitably are doomed. Some probably are here to stay because of excellent technological research and development. And some have been foisted upon us by a small group of dictatorial no-talents who decide what the movie-going public wants sheerly on the basis that *they* want it that way.

Now these new processes have been born out of many things ranging from an honest attempt to improve the industry to hysterical desperation. But between the introduction of sound and the arrival of TV, this was perhaps the only major industry in the world that turned its back on research and development. Imagine what your automobile would be like today if Detroit had felt the same way in 1929!

And so here we are looking for the lost audience. But it seems to us that the researchers have missed one important survey: has anyone bothered to ask the movie-going public just what *it* wants? Being fairly close to projectionists, we know that there is as much diversity about new processes versus old, sound, projection techniques, etc., as there are personalities. But nobody took a survey of projectionists, who for a time looked dangerously like the whipping boys in the new deals.

It isn't a lost audience. It's just unasked. So let us put aside for the time being age, sex, annual household income, geographic regions, *et al.* and ask the public what it thinks of the new processes.

The answer might turn out to be something simple, like good pictures.



INTERNATIONAL PROJECTIONIST

Volume 32 AUGUST 1957 Number 8

# For a Brighter, Flickerless Picture

By ROBERT A. MITCHELL

**Recent developments in more efficient intermittents have pointed up the fact that the present-day 3-to-1 movement will eventually have to give place to the faster 5-to-1.**

AN UPSWING in the prosperity of the motion-picture exhibition industry depends upon improvements to come—improvements in cinematography, sound recording, sound and picture projection, and patron comfort in the theatre. Above all, the screen, having nearly split its seams in physical expansion, must begin to expand *emotionally*. Dramatic intimacy must be restored to the photoplay, for the success of commercial movies depends largely upon their power to involve the emotions and feelings of the audience.

Theatre movies should be made for entertainment only. People go to the movies for emotional refreshment—to experience vicarious thrills, to "identify" themselves with the depicted characters, to become immersed in the new worlds of emotional experience and "atmosphere," to laugh, and even to cry. They do not go to be educated or edified, or to receive a "message." For a message (as a wise film producer once remarked), one may go to Western Union.

Now, in order to do a good job of entertaining the world, the motion-picture film—fragile ribbon of celluloid—must be "translated" by the projectionist into sight and sound. His powers are limited only by the capacities of the picture-projection, and sound-reproducing apparatus.

Let's concentrate upon the picture itself, and some of its common imperfections: the deficient brightness of the picture in many large theatres and drive-ins, for example, and the flicker noticed in the highlight areas of excessively bright pictures on smaller screens. Both defects of present-day film presentation are interrelated, for both can be "cured" by making a single change in the projector mechanism.

### *50 Per Cent Light Waste*

The projector shutter, we know, cuts off and wastes at least half the light

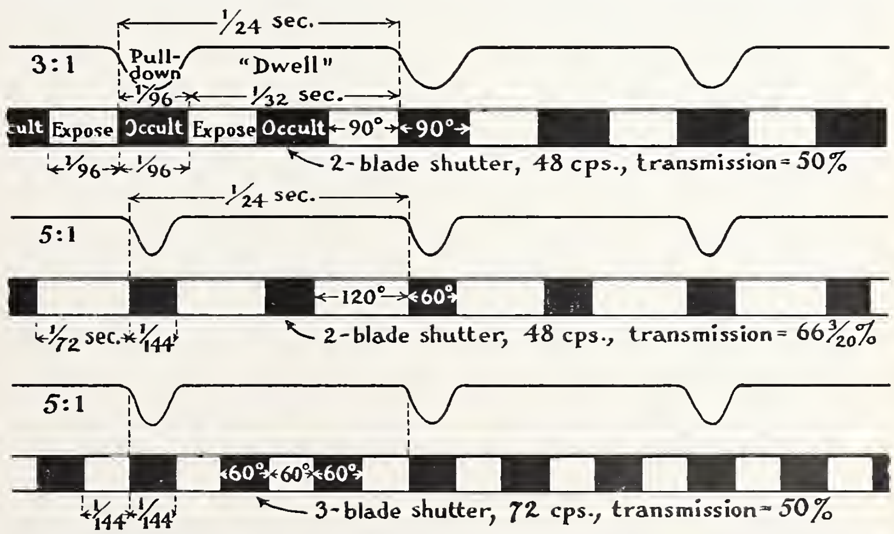



FIG. 1. Diagram illustrating the relative periods of exposure and occultation by three types of shutters used on motion picture projectors. The two shutters having 60-degree blades are suitable for use only with intermittents having a 5:1 ratio of "dwell" to "pulldown" time. The standard 3:1 geneva movement requires 90-degree shutter blades.

thrown forward by the projection light-source. No matter how powerful the arc lamp, at least half of its output falls upon the blades of the rapidly revolving shutter, and hence never reaches the screen.

In actual practice, the transmission of light by the shutter is *somewhat less than 50 per cent* in the interest of picture quality. The edge of a shutter blade must cut through the light beam with great rapidity to allow the maximum transmission of 50 per cent to be attained. If the blades of a slow-acting shutter are trimmed for a 50 per cent transmission, film movement may be revealed on the screen as flickery streaks of light emanating from the tops or bottoms of bright objects in the picture—"travel ghost."

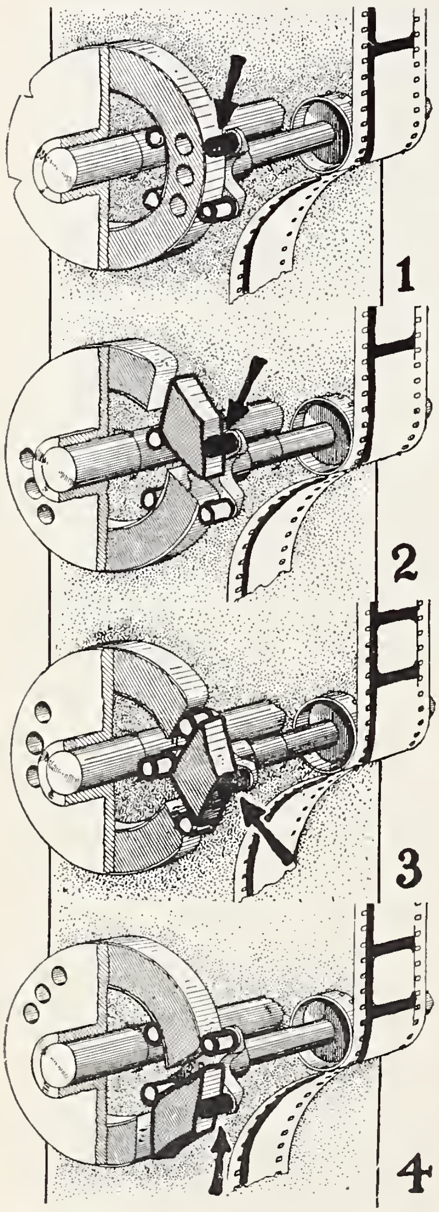



FIG. 2. How the pin-cross intermittent works. One of the four pins is shown in black for identification. Follow its action to see how the diamond rotates the cross and attached sprocket which, of course, moves clockwise.

What about flicker in the highlight areas of bright pictures? Television has the advantage of a very rapid *field rate*, equivalent to 60 shutter cutoffs per second, but the theatre movie still employs the 48-per-second cutoff rate introduced when sound pictures became standardized. As a result, the bright areas in theatre pictures—snow, clouds, etc.—are marred by "shutter flicker," while the highlight areas on TV screens, no matter how bright, flicker scarcely at all!

Note, however, that the "field rate" has a frequency higher than the "frame rate" in both TV and movies. TV employs 30 "frames" (interlaced fields) per second for line telecasts and for video tape, while standard film productions both on TV and in the motion-picture theatre run at 24 frames per second. (In order to conform 24 frames per second with the TV field rate of 30 per second, successive film frames are scanned 2 times, 3 times, 2 times, 3 times, etc., while in the theatre, each film-frame is flashed on the screen 2 times.)

### *Shutter Flicker Problem*

It is obvious, therefore, that the theatre-projector shutter does not revolve rapidly enough to eliminate the effect of shutter flicker. Only at the lowest light levels is this type of flicker invisible. "Persistence of vision," the characteristic of human sight that tends to carry over one screen image to the next, masking the intervening periods of darkness, becomes less effective at high light levels.

Todd-AO 70-mm film is photographed and projected at 30 frames per second to give 60 alternations of light and dark with a conventional 2-cutoff shutter; and it has been suggested by several writers that the same be done with standard 35-mm film. The result on the screen would be virtually flickerless projection.

A particular advantage mentioned by Joseph Holt on page 13 of the May 1957 issue of IP is the elimination of 12-cycle "beat flicker" caused by arc rectifiers operated on 60-cycle AC. But 50-cycle AC is used in most countries; and foreign projectionists might not appreciate the 10-cycle beat flicker resulting from a 60-cycle field rate in projection. There is a better solution to the problem—a solution now being

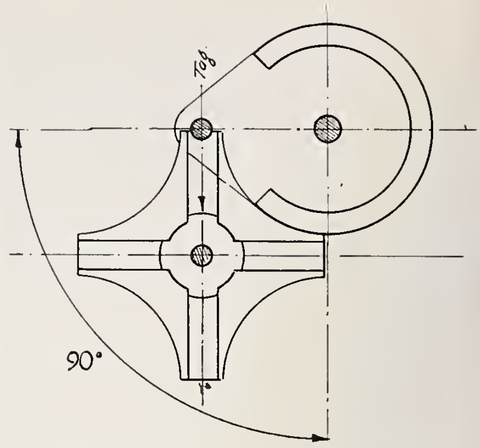



FIG. 3. Standard 3-to-1 geneva movement.

realized in projector manufacturers' engineering laboratories, and one which requires no change from the universally adopted film frame-rate of 24 per second. The cutoffs produced by the projector shutter are increased in frequency from 48 to 72 each second!

It is not enough, however, merely to speed up the rotation of the shutter,

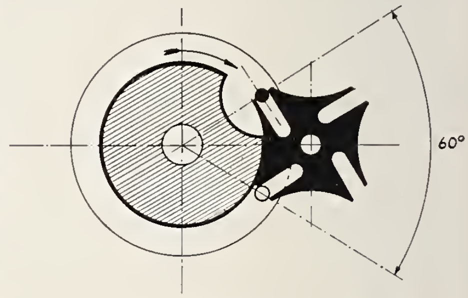



FIG. 4. Eccentric-star intermittent which uses enlarged cam but avoids off-tangent relationship between cam pin and star wheel by altering position of star-wheel slots.

or to provide a 3-blade shutter to replace the conventional variety having 2 blades. The operation of the standard geneva intermittent movement does not permit this to be done.

The geneva movement has what is called a 3-to-1 pulldown ratio. When the action of this movement is analyzed, it is found that the intermittent sprocket is "at rest" 3 times longer than the time-interval consumed by the film-pulldown. It may accordingly appear that the shutter would require only one blade to cut off the light only during the actual pulldown, and thus have a light-transmission of 75 per cent. A 1-blade shutter, however, would result in a 24-cycle cutoff frequency, and the flicker would be intolerable.

By adding a second light-cutoff in the middle of the "dwell period" when

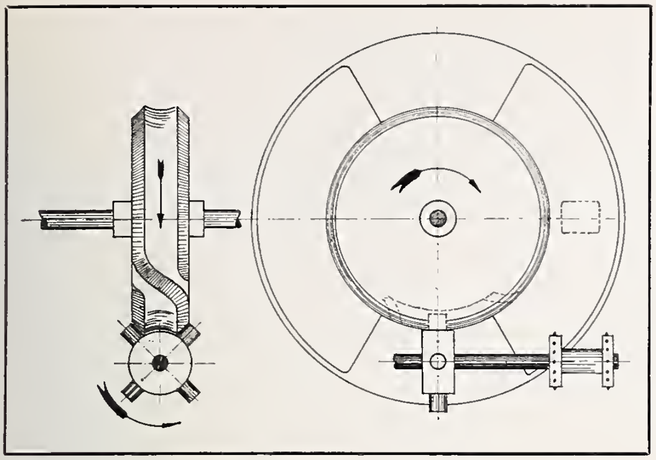


FIG. 5. The Wright drunk cam movement of the pin cross type.

the film and the intermittent sprocket are at rest, the shutter frequency is increased to 48 cycles, but transmission falls to only 50 per cent (or slightly less, depending upon the rapidity of shutter action). But a 48-cycle cutoff frequency, we have seen, is not high enough to eliminate flicker when illumination levels are high.

Suppose the shutter is made with three blades and openings of equal widths to give a cutoff frequency of 72 per second. Instead of 90 degrees, the width of conventional shutter blades, blade-width in 3-blade shutters is only 60 degrees. This, however, is not enough to conceal the film during the entire pulldown interval; and severe travel ghost would flare from the upper and lower edges of all bright objects in the projected pictures.

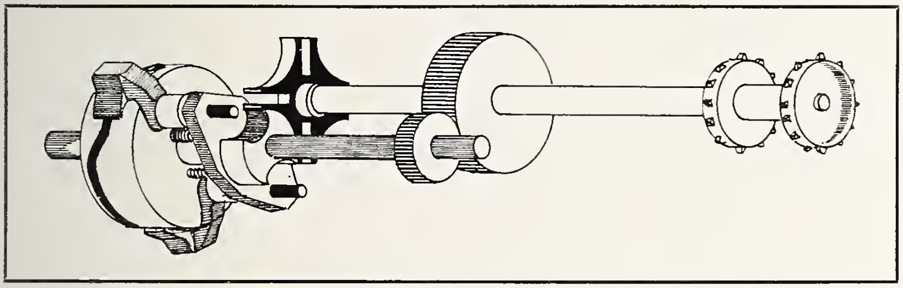


FIG. 6. Diagram of the Jackson intermittent movement developed for RCA model TP35CC color television projector.

### A Needed Replacement

To employ a 3-blade shutter, therefore, the 3-to-1 geneva unit must be replaced by a 5-to-1 movement—an intermittent which remains at rest 5 times longer than it is in motion. As Fig. 1 shows, the ordinary 3-to-1 intermittent is too sluggish. When the pulldown of the film is as rapid as that provided by a 5-to-1 intermittent, a 60-degree shutter blade is sufficiently wide to hide the film during the intervals of travel in the gate.

A wide variety of sprocket-type intermittent movement faster than the conventional 3-to-1, or 90-degree geneva movement has been described in detail by Jose Ruiz in a series of articles published by IP (November 1955, p. 13 *et seq.;* December 1956, p. 18, *et seq.;* January 1957, p. 13 *et seq.;* and February 1957, p. 26 *et seq.*). They include pin-cross, eccentric-star, drunk-cam, oscillating cam, and accelerated-geneva movements, all adaptable to 35-mm theatre projectors.

The Powers movement is undoubtedly the most familiar of the pincross family; for the crude, but smooth-running, Powers projector was used in thousands of theatres. Fig. 2 illustrates the action of this excellent 5-to-1 intermittent, a film-shifting device so rapid and accurate that many projectionists preferred it to the geneva-type movement.

Figures 3 and 4 show a comparison of the construction and characteristics of standard 3-to-1 and eccentric-star 5-to-1 geneva movements. Because the rate of acceleration of the eccentric-star movement is slower than its rate of deceleration, this intermittent should be operated in one direction only. This is not a disadvantage, however, as theatre projectors are never run in reverse.

### Eccentric-Star Movement

There is no well-known theatre projector in which the eccentric-star movement is used at the present time. It was introduced in a 28-mm Pathescope projector as early as 1920, and worked excellently. The acceleration-deceleration characteristics of this 5-to-1 geneva-type intermittent may be modified by slightly curving the non-radial slats; but it commends itself, even in its straight-slot form, as a simple and effective device for replacing conventional geneva intermittents in 35-mm theatre projectors.

Drunk-cam movements exist in many variations, the one shown in Fig. 5 being one of the simplest. They have the advantage of perfect control of acceleration and deceleration of the pin-star—the groove of the drunk-cam may be designed according to any de-

(*Continued on page* 34)

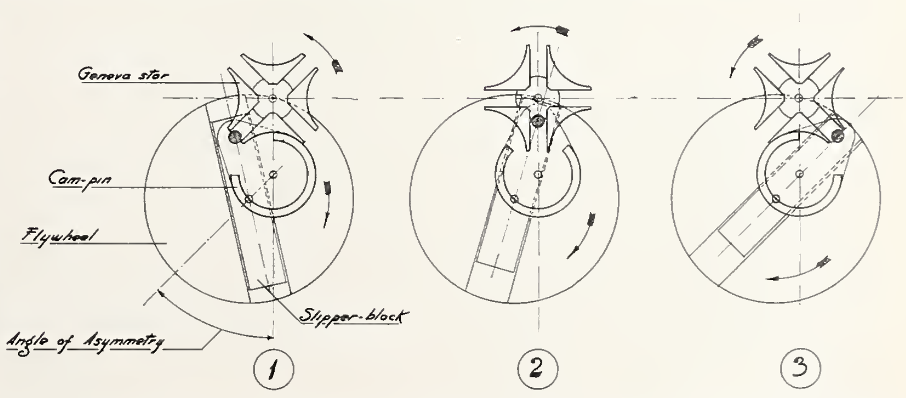



FIG. 7. Three positions in the pulldown cycle of the Radion II, a 35-mm projector manufactured in France that uses the acceleration system now successfully used in 16-mm. The offset driving shafts and "slipper block" described in the accompanying article make it possible to accelerate the pulldown action of a standard-size geneva star wheel and cam.

# Television and Motion Pictures†

By ALLAN LYTEL

**TV and motion picture projection have their obvious similarities, but the differences are not so readily apparent; this excerpt discusses them in some detail.**

A COMPARISON of projection television with motion pictures reveals that the similarity between the two mediums is obvious; the differences, though more significant, are not so readily noticed.

The motion-picture projector has a light source which has no relation to the film. The light source may be made as bright as required irrespective of the method of projection. In television the light which is projected from the picture tube comes from the television image itself. The cathode-ray tube provides its own light, and there are many limitations to the amount of it available. The cathode-ray picture tube screen can withstand only a certain degree of electronic bombardment; excessive agitation of the atoms of the screen material by electronic bombardment, in the attempt to produce an exceptionally bright picture, may burn the screen, thus rendering the tube useless.

No cathode ray picture tube can provide a light source as bright as the electric arc used in the motion picture projector. This is one important limitation placed on projection television.

Another great difference between motion pictures and projection television is the type of viewing: motion pictures are always viewed in a darkened room. On the other hand, television must provide an image bright enough for a normally lighted room.

### Large Picture Problem

But perhaps the most important point of difference between motion pictures and television may be seen in the scanning process. This means that only a very small section of the entire picture is presented at any one time by the electronic beam. In the motion picture projector, the entire picture is presented at the same time so that there is a still greater cause for the motion picture to appear brighter than the television picture, when observed under identical conditions.

For all of the above reasons, projection television still has quite a number of difficulties to overcome before presentation can be made that compares favorably with motion pictures. One is size. The television industry long ago saw that large pictures were needed and a number of systems to obtain them have been developed; several of these systems produce excellent pictures which are bright and large enough for theatre applications.

Two general systems of projection television have been utilized commercially. The first, and most popular system, uses a curved mirror to project and enlarge the image to be presented on the theatre screen. The second method utilizes a lens to collect the light from the picture tube and project an enlarged image to the screen. A third basic system, using a light-controlling system, or relay tube, with an independent light source, has been tried experimentally in several forms, and will be considered later in this article.

Large screen television, whether it be direct view or projection, is among the ultimate aims of the industry since the television user would like a picture large enough to be viewed without eyestrain. For TV pictures viewed direct without projection, 15 x 20 inches has proved to be approximately the maximum size. We may use it as a dividing line between large screen and small screen television.

Projection television will undoubtedly continue to grow in the direction already indicated by commercial theatre equipments. The refractive, or lens, system and the reflective, or curved mirror system will be improved, with better projection tubes and viewing screens. Brighter and more well-defined pictures may be expected. The definition of the picture, that is, the number of lines which it is capable of reproducing, is in fact better in the projection systems than in the radio receivers which accompany them. The optical systems have resolutions well beyond the present 525 lines.

There have been several other approaches made to the problem of large screen television which are quite different from the two systems mentioned above. Several of these systems do not even use cathode-ray tubes for the television receiver picture. One highly developed, although not commercially produced, television projection system uses an entirely different type of cathode-ray tube in order to form the image.

### Dark Trace Projection

In the ordinary cathode-ray tube, the electron beam scans across the fluorescent screen causing the screen to become bright where electrons strike and leaving the screen dark where there are no electrons. These alternate

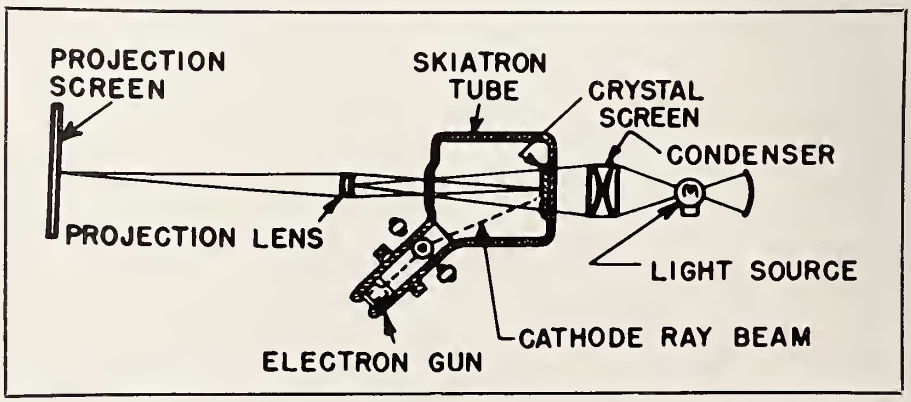



FIG. 1. Projection system using a Skiatron tube, which produces a dark trace picture.

†Condensed by permission from Chapter 6 of Mr. Lytel's book: "TV Picture Projection and Enlargement," John F. Rider Publisher, Inc.

spots of light and dark produce the television picture on the fluorescent screen.

Motion picture projectors use an outside light source in order to shine light through the film, which is made up of alternate light and dark portions. The light which forms the image on the motion picture screen comes from a source outside and totally separate from the film itself.

In projection television, as with any cathode ray tube television system, the picture is obtained from a fluorescent screen and the light comes from and forms the image at the same time. There is no outside light source and the picture brightness is totally determined by the amount of light which can be produced by the fluorescent screen.

If a system could be devised where the electron beam forms an image, and a separate outside light source could be used to project this image on a screen, the television system would be free from the very important limitation of image brightness. Several such systems have been designed and proved quite capable of producing large well-defined projected images. The Scophony Corporation of America perfected a projection system using a different type of tube which is known as the Skiatron. "Skia" comes from the Greek, and means "shadow"; the Skiatron is a cathode ray tube which produces a dark-trace picture, as follows:

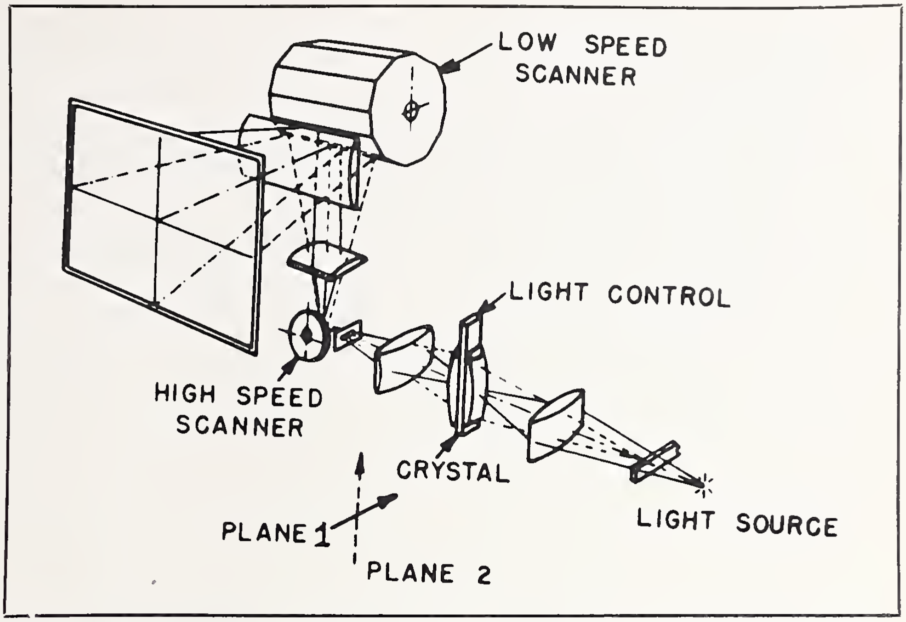



FIG. 2. The complete Supersonic television system. The very small scanner is the horizontal scanner, and the very large scanner is the vertical.

### *Skiatron Operation*

Certain crystals have the property of transmitting light normally, and of becoming opaque when struck by a beam of electrons. The electron beam is emitted from the bent neck of a specially shaped CR tube. The beam scans a special screen of such crystals. Light rays from a powerful light source are reflected by a concave mirror and gathered by a condenser lens. These light rays are then projected through the crystal screen, gathered by a projection lens, and projected to a viewscreen.

With no electron beam scanning the crystal screen, the projected picture will be all light, just as would the picture from a motion picture projector if no film were present. However, the crystal screen has, as said, the unusual property of becoming dark or opaque wherever electrons strike. A great number of electrons falling on any given point will mean a completely dark portion of the screen, and no electrons falling on the screen will allow all of the light to pass. If a few electrons fall on a particular point, the brightness of the screen will be somewhere between white and black, or a shade of gray. Thus, this special crystal screen will have a dark-trace image produced upon it wherever electrons strike. This picture will be the reverse of the normal television picture and it is produced in exactly the opposite manner to the normal television image.

This system of projection operates in a manner quite like motion pictures, when a complete image is placed in front of the light source and thrown upon the screen. One very important feature of the Skiatron tube is the "memory" which the crystal screen possesses. In exactly the same manner as a fluorescent screen retains the light image for a short period of time this crystal screen remembers the dark image for a short period of time. It retains the sweep of the electron beam, an effect which is known as light storage. Since the crystal screen retains or remembers the image for one complete field, a full image is projected at one time. This television image must be projected; it cannot be seen by direct view. The shadow image on the crystal screen is not in itself visible unless an outside light source is shining through the tube; therefore, a projection system must be used.

There is one further difference between this projection system and the conventional systems. Since this electron beam creates a dark image, it is the opposite of the normal image presented on the normal cathode ray tube. On the ordinary tube more electrons in the beam correspond to a brighter signal and fewer electrons to a darker signal. With the Skiatron the process is reversed, for a greater number of electrons in the beam means a darker picture and a fewer number of electrons in the beam a lighter picture. All that is required to convert an ordinary receiver to a dark-beam is a simple method of changing the signal applied to the cathode ray tube—a method of inversion is needed. This may be very easily accomplished electronically and is often done commercially and in experimentation.

### *Inverted Signal*

As is explained in texts on television practice,* the normal carrier modulation is such that high amplitude corresponds to dark portions of the picture. A phase-inverting circuit, in either transmitter or receiver, will invert the signal so that modulation peaks correspond to light portions, and valleys to dark. Such a process in the receiver is used to supply information to the Skiatron tube. Since the greater the number of electrons which reach the crystal screen, the darker the picture, all that is necessary is to reverse the information supplied to this cathode

* For example: "Television—How It Works," John F. Rider Publisher, Inc.

ray tube. By this process, a positive or normal image is presented by the crystal screen.

Any system of projection must have some method of optical storage in order to produce a bright image. Since the electron beam in the ordinary cathode ray tube scans 525 lines for each image, it is important that the greatest amount of light be retained from one sweep until the next. This same problem was encountered and solved in television camera tubes. Here the original picture must be scanned by an electron beam, and the information supplied for the use of the television transmitter.

Doctor Zworykin originally solved this problem with his brilliant invention of the Iconoscope. This television camera tube actually retains the picture image from one scan until the next, and although only one picture element is scanned at any one time the camera tube remembers the picture from one time to the next. It is as if the entire picture were scanned at once, although this quite impossible. Exactly the same type of system may be used for projecting the picture image. Where the image is presented on a device having light storage qualities, many lines in this picture may give off light at the same time and thus vastly increase the picture brightness.

### "Supersonic" Television Projection

The Scophony Corporation of America has also developed a "Supersonic" television system which is quite different from both the conventional television picture tube and the dark-trace television tube. It is designed around a device known as the supersonic light modulator cell, which consists of a piezoelectric quartz crystal mounted at one end, a glass window mounted at either side, and a layer of vibration-absorbing material, such as cork lining, at the end of the cell opposite the quartz crystal. The entire body of the cell is hollow and is filled with a liquid. The piezoelectric crystal is caused to oscillate at any frequency between 10 and 20 megacycles. These oscillations are amplitude-modulated by the television signals from the receiver.

The entire action of this system is based upon the liquid-filled cell. When the pieozoelectric crystal is caused to vibrate, waves travel down the liquid to the opposite end of the cell where they are absorbed. Since these waves have the character of compression and rarefaction, exactly like sound waves, but are of higher frequency, they are called supersonic.

A compression is the bunching together of particles in the wave and rarefaction is the moving apart of particles in the wave. Light from an outside source is passed through a slit, then through a special long thin lens into the cell and through the cell. The waves traveling through the liquid have a peculiar effect upon the light passing through the cell. The light is broken up into a series of vertical lines which are light and dark depending upon the wave and its amplitude. These light and dark bands are caused by diffraction of light, or bending of light rays. Ordinary diffraction of light rays occurs whenever these light rays are bent out of their normal path because of an obstruction.

Diffraction is not to be confused with refraction. Refraction is the bending of a light ray because of change in the velocity of light as it passes from one material to another; diffraction is the spreading of light around a corner in the manner of water-waves.

The supersonic waves in the liquid act to form an obstruction, and cause diffraction of light passing through the cell. In order that no light may be received from the cell when there is no signal present, a bar or stop is mounted to obscure light rays coming from the cell. Thus, only signal variations in the liquid of the cell permit light to reach the screen. When no signal is present, light is stopped by this bar but when a signal is applied to the crystal, the light rays are diffracted from their normal path and appear on the viewing screen. A lens is used between the bar and the screen to focus the light rays and project a total image.

### Cell "Memory"

Since the light-controlling signals pass from one end of the cell to the other by means of wave motion in the liquid, this cell may be said to have a memory or light-storage action which permits many different signal variations to be present at one time, one right after the other. For the ordinary 525-line television picture a 2-inch-long liquid cell is able to show 250 picture elements at one time. Thus a substantial portion of a picture line may be shown at one time. This means that the system is capable of illuminating much more than one picture element at any one time and therefore is capable, with a bright light source, of producing a very bright picture on the screen.

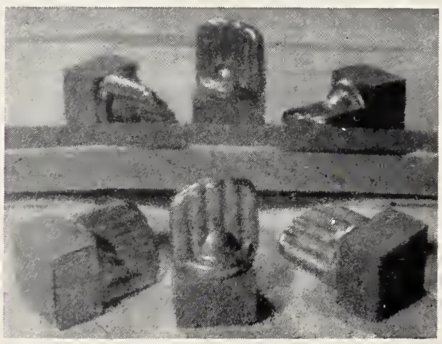
Supersonic television, therefore, uses the light storage principle as well as a type of projection. The light

*(Continued on page 32)*

## New Non-Magnetic Sandpaper Holder for Splices

For a strong, satisfactory splice, complete removal of emulsion and binder coatings from the film base must be effected. On certain types of color film, there are coatings on both sides of the film, and both surfaces must be scraped, and thoroughly cleaned. Even a slight film of oil may result in an unsatisfactory joint.

Recognizing that sometimes this factor is overlooked, Floyd W. Ringer, member of IA Local 261, Salina, Kansas, has developed a non-magnetic aluminum sandpaper block as an aid to better splicing. The basic principle is that if the film base is roughened on both back and front surface after removal of emulsion and binder, the adhesive qualities of the cement will be materially improved, and the finished joint stronger.



**The Ringer non-magnetic splicing block.**

The aluminum ½ X ¾-inch block produced by Ringer features a thumbscrew that clamps on the sandpaper strip. Being aluminum and non-magnetic, it will not cause any unwanted sound on the track. There are six useable sides before replacing sandpaper, 4 on the base, and 2 on the sides. Sandpaper is simply replaced by unscrewing thumbnut.

The block, which retails for $1.00 postage paid, may be used on 8-, 16-, and 35-mm film. It may be obtained from Floyd W. Ringer, 230 South Third St., Salina, Kansas. The kit includes 2 feet of ¾ inch sandpaper, and replacements of 5 yards lengths are available.

**Several systems have been introduced for pre-setting the lens rack, but most have not been applicable to every situation.**

# Some Methods for Solving Focus Drift Problems

By JOSEPH HOLT

Member, IA Local 428, Stockton, Calif.

TAKING PROJECTIONISTS' conversations and letters as an indication, it seems sure that out-of-focus and drifting focus conditions rank high as a projection room problem.

Several methods have been proposed for pre-setting the lens rack to secure a sharp picture from the very first frame; we should like to discuss some of them here. The first step for better beginning focus will seem elementary, but few projectionists indeed seem to take the time to rehearse each reel for the proper setting of the lens rings.

To indicate the folly of this failure, let it be considered that a usual program consists of two features in color, one of them in the anamorphic process. Both lenses should be set for the best focus of each feature obtained under actual projection; the lens stop collars should be readjusted for these positions.

The remaining units of the program —newsreel, shorts, etc., will usually deviate from these settings. One of IP's projectionist readers has suggested the use of a focusing cue-sheet, and the use of numbered strips mounted adjacent to the lens rack knob.

Others have approached this matter of pre-setting the lens by the use of a mechanically coupled dial indicator which will read in the area of three decimal fractions of an inch. This is better than nothing, but good dial indicators are expensive. And there may be considerable error under the conditions in which they are to be used.

MGM projection supervisor Merle Chamberlain.* in association with Hall Huff of Los Angeles, has produced a device which, it is claimed, will replace the moisture baked out of the film during projection. The device atomizes water and introduces the vapor into the automatic rewind while the film is being rewound.

This method can help in some areas, but there are states and cities where enclosed motor-driven rewinds are not used. In those locations the projectionist must see to it that the film storage areas and bins are kept humid.

### *Different Curl Radius*

One important cause of focus drift at the reel end, as compared to opening footages, is the different radius of curl introduced by storage of the film with the head out, emulsion side facing up on the reel. A number of exchanges and laboratories have adopted the practice of storing film wound tail out and emulsion up. Projectionists may find it advantageous to leave film wound in this fashion overnight. It is advisable to leave a prominent notice to the effect that the film has been stored tail out. The writer has found some focus trouble to be lessened by such overnight storage.

It is not enough merely to allude to the problem on in-and-out conditions of focus, and by implication dismiss it as something beyond the control of the projectionist. True, the introduction of lenses of wider effective aperture has decreased the depth of field of critical focus. This improvement in lenses has placed extra responsibility upon the projectionist to pay close atention to the screen throughout the entire reel; but it follows that even close supervision cannot always result in the sharpest images. Even as the careful projectionist probes for a position of better focus, he will usually run over the optimum point, then back up for a recheck—and the picture has gone from slightly out to sharp focus, slightly out again, and finally back to the point the projectionist may ultimately select.

Therefore, it is not mere idle curiosity on the part of those who have suggested some of the stratagems we have reviewed here. It is a very real and present problem which deserves greater attention. We have suggested the rehearsal of those parts of the program which may differ in lens settings from previous film run in the theatre, but it is our opinion that management has a responsibility to take an active part in this setting-up procedure.

### *Monitoring the Screen*

A responsible person should be available to monitor the screen as to sharp focus, and some staff member should be present in order to call immediate attention to any lapses. Those of us throwing a picture from distances over 100 feet must recognize that we cannot be certain of good focus merely by checking with the naked eye. Good

(*Continued on page* 34)

* Mr. Chamberlain has since been promoted editorial administrator of MGM.

## NTS INSTALLS NEW H-I CONSTELLATIONS IN FOX FLAGSHIP


Three new high-intensity National Constellation 170 arc lamps have been installed in the Fox Wilshire Theatre, Beverly Hills, Calif., for the world premiere of "The Pride and the Passion." Shown, left to right, are projectionists Ed Slocombe and E. C. Barden, members of Local 150, and John Denny, service manager for NTS in Los Angeles, who did the installation. Lamp's task is to light a 26- by 50-foot screen.

**Since the advent of the Cinex projection lamp, developments and experiments have not ceased, as indicated by the emergence of Super Cinex.**

# Super Cinex Improvements

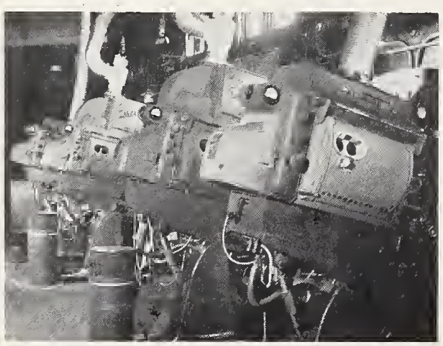

## By CLARENCE ASHCRAFT

C. S. Ashcraft Mfg. Company, Inc.


MANY MAJOR ADVANCES have been made in projection light sources within the past few years. These, of course, were essential for the production of increased illumination necessary for the larger drive-in theatre screens and greater screen brilliancy for indoor theatres—particularly those projecting wide film. Lamps previously on the market are gradually being replaced with the newer and more powerful types, capable of projecting up to 36,000 lumens through the old standard .825-inch x .600-inch apertures, and up to almost 50,000 lumens when the wide film apertures are used.

Only a few years ago (1953) the highest light values were in the 25,000 lumen range. I refer to practical operation, it not being considered practical for carbon consumption to be in excess of 22 inches per hour, particularly when special high priced carbons are used. The newer modern lamps produce far more light with better distribution at a much lower operating cost. When higher illumination is made possible with lower carbon consumption rates, using cheaper carbons with less electrical energy, it can only be considered an achievement; but you may be assured it is a hard won achievement.

Since this is a special article written for the International Projectionist and directed to the projectionists throughout the world, many of whom spend a considerable part of their lives operating Ashcraft projection lamps, it has occurred to me that it might be interesting as well as informative to know how the new high powered lamps were developed, designed, improved and perfected to the high degree of the Ashcraft Super Cinex. It is capable of projecting the most possible volume of light through any size of aperture from .825 inches x .600 inches. to 2.010 inches x .788 inches with better distribution of light over the entire screen surface.



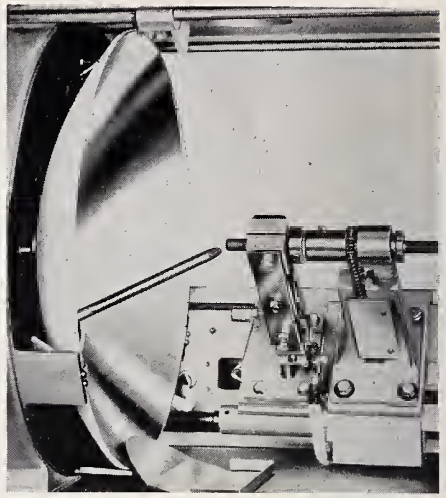
Shown here are two Ashcraft Super Cinex's flanked by Super Powers recently installed in the Gaumont-Palace Theatre, Paris, France.

### *What the Cinex Is*

The name "Cinex," which is a registered trade mark of the C. S. Ashcraft Mfg. Co., denotes a projection lamp using an 18-inch reflector, an air circulating system which injects and exhausts air over the glass reflector surfaces. The blowers are located in the lamphouse top. The Cinex lamp is equipped with two water-cooled carbon contacts for the 11-mm carbon used in that lamp. This lamp was first exhibited in November 1954 at the TESMA Convention in Chicago, Ill.

The New Super Cinex has all the highly developed features of the Cinex including the 18-inch air-cooled reflector—the air circulating system with blowers mounted in the lamphouse top—the intensely water-cooled contacts; but the Super Cinex employs a 13.6 carbon—a more powerful magnetic arc stabilizer, and has been modified for Cine-Stereo operation. The terms Cine-Stereo and Pre-Angle are not merely names but designate a new and more highly efficient optical system for motion picture projection.

Let us begin the story of the development of the Super Cinex in August 1953. Prior to that time there were no such things as 18-inch reflectors used in projection lamps—no air cooling of reflectors—no direct water cooling of both carbon contacts—no higher speed lenses than $f/2.0$ and $f/1.9$. Lamp optical speeds were $f/2.2$. Arcs of all makes were equipped only with 16-and 16.5-inch reflectors with a recommended working distance of 36 to 37½ inches. The largest diameter carbons were 10-mm operating at 90-100 amps with standard carbons and 120-135 amps with Hitex. The 11-mm carbon was just being adopted by lamp manufacturers.



Interior view of the newly improved Ashcraft Super Power lamp, showing the water-cooled contact heads initiated in the Super Cinex. At left, the reflector ring that is designed to eliminate heat pockets.

Manufacturers of projection equipment are faced with the same problems as, let us say, manufacturers of automobiles. There must be continual progress entailing research and development or you just don't stay in business. If the automobile industry had refused to progress we would still be driving Model T Fords and Maxwells instead of the Lincolns, Mercurys and Chryslers of today. Likewise, if the projection lamp manufacturer had insisted his 1945 model was good enough there would be no large drive-ins, no wide screen pictures, and no wide-film road shows, and the lamp manufacturer would be out of business. The progressive lamp manufacturer will stay in business as long as there are motion pictures. Every new process is a challenge which must be met with an improved product.

### *Initial Challenge*

Our first challenge was the demand for more light in drive-in theatres when screen sizes increased in width

from 100 to 120 feet for CinemaScope. The 10-mm carbon with a 16-inch reflector was entirely inadequate with $f/2.0$ or $f/1.9$ lenses. Fortunately, in anticipation of the necessity for more screen illumination, the Kollmorgen Optical Co. in the latter part of 1953 was about to introduce their new $f/1.7$ and $f/1.7X$ lenses. These were submitted to our company and to other lamp manufacturers. These new high speed lenses were of little value when used with an $f/2.0$ lamp. We therefore took the initiative and produced the first 18-inch reflector, high speed projection lamp.

In order to coordinate with maximum efficiency with the $f/1.7$ lenses the lamphouse was shortened 1 inch—thereby reducing the working distance to 34 inches—giving the lamp optics a speed of 1.64. Just how well this new arrangement proved to be is illustrated by the fact that we went into actual competitive demonstrations against our own 11-mm 16-inch reflector lamps, sold a year before, and improved the screen light 25 per cent, using the same carbon at the same current in both lamps. It also proved that the drive-ins would buy new lamps, if the illumination could be increased by 25 per cent with no increase in operating cost.

No sooner had we solved the increased optical speed problem of our lamp, which we designated by the name Cinex, than we were faced with another challenge—70-mm film projection with a reflector lamp. In September 1954 the American Optical Co. approached our company relative to the development of a lamp suitable for wide film projection.

#### *Overheating Problems*

Realizing that the 11-mm carbon even with the 18-inch reflector could not possibly cover the much greater aperture width, we adapted the 13.6 standard grade carbon to the Cinex Lamp. Simply using a larger carbon by no means solved the problem but it did involve us in several more problems. The arc became unstable, the reflectors broke, the lamphouse overheated and the contacts as designed at that time burned up. All this was the result of trying to increase the arc amperage from 125 to 165 amperes. All of those problems had to be solved before we could even make a wide film test.

To correct the heat problem we designed a complete air circulating system through ducts on the lamphouse front and lamphouse floor forcing the injected air through these ducts and over the surface of the reflector. The hot air and smoke of the arc was drawn from the lamphouse through an exhaust tube placed directly over the arc. A ball-bearing (totally enclosed) motor with a shaft extending from each end of the motor with blower wheels mounted on both shafts and enclosed in suitable housings provided the injection and exhaust means when connected to the duct system in the lamphousing.

Approximately 2,000 linear feet of air per minute was forced through the ducts, over the dichroic heat filter, over the surface of the reflector, and expelled out the lamphouse stack. This was the answer to the heat problem, the reflector breakage, and when properly directed the air assisted in stabilizing the arc. For completely satisfactory arc stabilization, a long powerful series electro-magnet was mounted in the rear of the lamphouse, the flux from which regulated the arc flames in such a manner as to cause the arc to burn very steadily with no perceptible movement.

#### *Water-Circulation Method*

To protect the contacts from the intense heat of the 165-170 ampere arc a completely new method of circulating the cooling water directly through the contacts was designed. Formerly the contacts were inserts in water-cooled blocks. So efficient was this new method that the high temperature arc had no deteriorating effect upon the contacts. In fact, after long periods of burning at high currents the white hot positive carbon could be withdrawn from the contacts and the finger inserted in the front end of the contacts. Heat dissipation was immediate and complete.

The new lamp which we had produced was most unusual, being the first American-built reflector lamp capable of using high arc currents (165 amps) with 13.6 carbon, and with less deterioration heat than the ordinary reflector arcs of that time (1954), using the 10- or 11-mm carbon at 120 amperes. The larger 18-inch reflector was protected from breakage by air cooling and the intensely water-cooled contacts gave every promise of extremely long life.

We would be justified in claiming that the combination of ideas which produced higher illumination and better light distribution were new and novel, but we knew that each new improvement had been used at sometime by others, but never incorporated in successful projection lamps. We made no effort to obtain a patent, but we did establish prior use for our protection by publishing articles describing the New Ashcraft Cinex 170 lamp in trade journals (March 1955). We were satisfied to clarify our brain-beating as development rather than invention.

#### *Drive-In Light Demands*

While the new Super Cinex was a distinct advance in the projection of 35-mm film it did not have what it takes for the perfect projection of the Todd-AO 70-mm film. The solution of this problem consumed another two years of intensive work. We were compelled at that time to hold in abeyance the development of the wide film lamp due to the immediate demands by drive-in theatres for more light. The Cinex 11-mm in combination with high speed lenses proved to be the answer. All our time was consumed in production of this lamp and the RCA Dynarc.

From then on I required assistance in proving the value of the 18-inch re-

(*Continued on page* 31)

### Panavision 3-Strip Print

A three-strip release print of Cinerama and CineMiracle type, from a Panavision 65 negative (also known as MGM Camera 65), has been developed by the Panavision organization of California. Cooperating in the development was the MGM Research and Development department, with tests conducted in the MGM studio laboratory. To demonstrate, a scene from the forthcoming MGM production of "Raintree County" was shown at the CineMiracle Theatre in Hollywood.

No image distortion—a usual bug in multi-camera operation—is claimed for the CineMiracle demonstration, which utilizes three projectors. (See IP, March 1957, p. 16). Designers of the system are aiming at the technical and economic advantages of the standard single-camera system. The Cinerama and/or CineMiracle extraction is reported to allow production of any type of release print in present use from negatives taken in the 65-mm process.

# TELECASTS

## GPL to Install NYC Educational TV

A CLOSED-CIRCUIT TV system that will bring educational training into the homes of 608 families living in the public housing area of the Chelsea district of Manhattan is planned by General Precision Laboratory. The cooperative project—linking the John Lovejoy Elliott Houses with Public School 33, the Hudson Guild Neighborhood House, and the Lower West Side Health Center—is believed to be the first of its kind in the nation. Sponsored by the New York City Board of Education, the Hudson Guild, and Language Research, Inc., it will be financed by a $200,000 grant from the Fund for the Advancement of Education.

Programs will originate at the elementary school, the health center, and the neighborhood house. A vidicon film chain installed in a central TV control room at P.S. 33 will provide filmed information directly to the houses at any hour of day. Another classroom in the school will contain a static, four-camera TV system with switching equipment that will permit either teacher or control room operator to select any one camera for a particular subject to be covered by merely pushing a button.

Lectures will be received in each of the school's 40 classrooms by a TV set in each room, plus a GPL projection system in the auditorium that will throw a 9 by 12-foot picture for large groups of students.

Telecasts emanating from the Hudson Guild will be provided by four GPL vidicon cameras which may be individually selected for desired subject. There will be one camera at the health center. The system requires no cameraman. Channel 6 will carry the programs from all three sources, piping into each family's TV receiver.

### *Large Program Coverage*

Program coverage will include language courses, health, nutrition, music, art, science, meetings, children's performances, and other aspects of adult education and community activities. The project will also serve as an experimental studio for development of educational TV, and as a pilot program for a special audience TV system appropriate to a small community or a chain of public housing buildings. A close evaluation will be made of the system's effectiveness on both adults and children, and its ability to effect a closer relationship between school and community. The problem will be to provide programs of mutual interest for diversified nationality groups on community problems, citizenship, and school programming.

Tentatively, the production staff planned will consist of a director, assistant director, technician, secretary, and a group of part-time consultants and evaluators. The project has the cooperation of the New York City Department of Health and Welfare, the New York City Housing Authority, New York City libraries, the Harvard Graduate School of Education, and the New York University Division of General Education.

## TelePrompTer Booms

TELEPROMPTER CORP., which started six years ago with the well-known prompting device which causes the performer to look everywhere but at the camera, now manufactures and services 18 different devices for the industry.

Newest among these is a 55 lb. slide

(*Continued on page* 33)

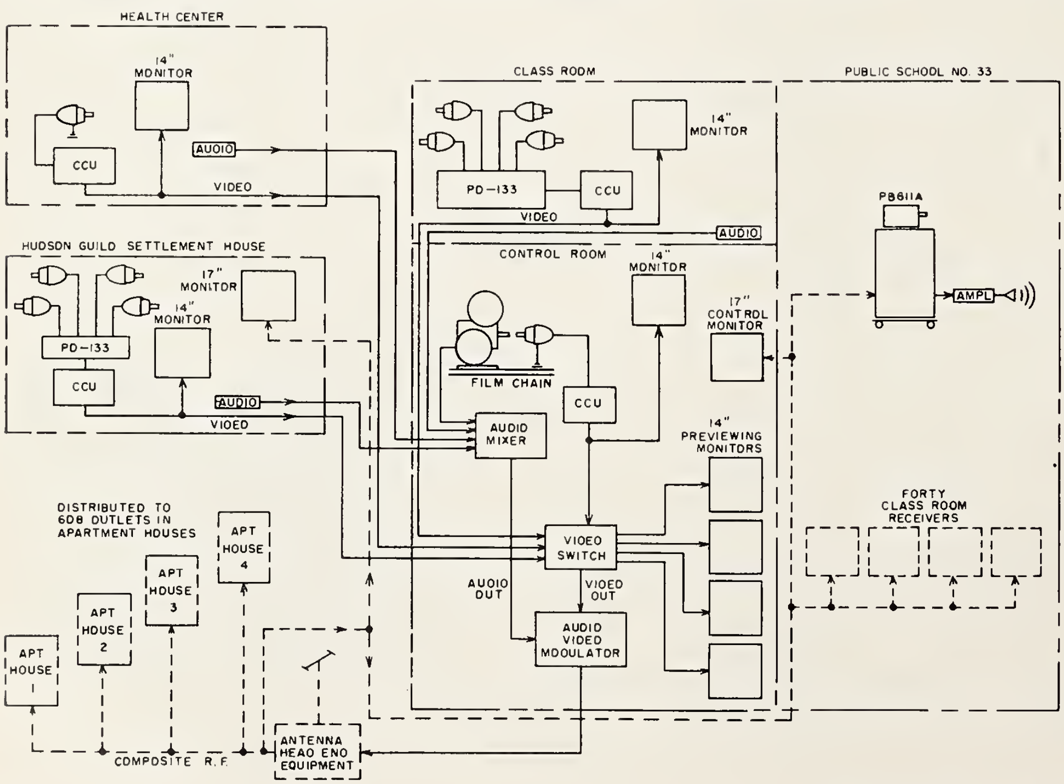



**Diagram of closed-circuit television installation for New York City's Chelsea District. Engineered by GPL, the network links the John Lovejoy Elliott Houses with Public School 33, the Hudson Guild Neighborhood House, and the Lower West Side Health Center.**

**One attempt to solve the continual problem of film heat is this European idea involving special masks.**

# Ernemann "Anterior Gates"†

UNSATISFACTORY DEFINITION of the screen image is frequently caused by the film being warped in the film gate. It must always be borne in mind that it is the emulsion which absorbs the light and heat rays of the projection lamp and transforms them into heat, while the film base of cellulose acetate or nitrate is heated to a much smaller degree. Consequently the hot emulsion expands more than the cooler base and so the film is warped (Fig. 1). An interesting fact is that cellulose acetate film has a greater tendency to warping that nitrate film.

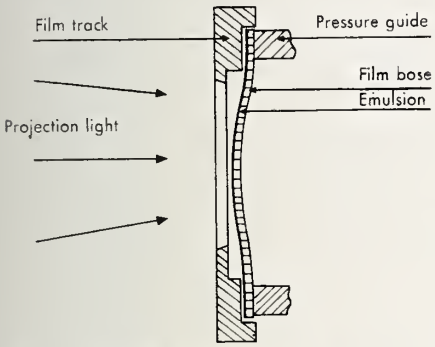



**FIG. 1. Diagram showing warped film in the film gate.**

There are two different causes of heating up of film: the absorption of light and heat rays transmitting the image on the film to the screen, and the unavoidable heating of all metal parts near the film strip.

The heating of film in the film gate can be reduced effectively by air cooling. When the light output is very high, glass and water filters (in cuvettes or shallow troughs) are interpolated in the path of rays between arc lamp and projector in addition to air cooling. These filters absorb almost completely the fairly large amount of invisible heat rays, but reduce only slightly the visible radiation.

### Heated Film Track

Apart from the direct radiation, the influence of the considerably heated metal parts near the film track should not be underestimated. While, for instance, the individual film image is exposed to the projection light only during the two short 1/48 second brightness intervals, the metal parts of the film track are exposed to heat during the entire period in which the film is running through the track. It is therefore of the greatest importance to keep as low as possible the temperature of the film track and all metal parts which are apt to increase heat radiation to the film. This will also facilitate the work of the projectionist who would otherwise have to touch the very hot metal parts when threading the film.

One effective means of reducing the temperature of the film track has been the water cooling in the Ernemann V, VIIb, and X "cold" projectors.

This water cooling, however, necessitates a considerable amount of mechanical fittings and components, which are expensive and can only be employed therefore in projectors of the highest order.

Projectors of the lightweight type such as the Ernemann IV and IX, which are used by small or medium-sized cinemas and with amperages of not more than 50 or 60 amps., are now equipped with heat protection masks, usually called "anterior gates," which keep the film temperature within permissible limits.

The anterior gate of the Ernemann IX consists of two metal plates lying at a distance of a few millimetres in front of the film track. They are cut out so that they shield as effectively as possible radiation which heats up the parts of the film track adjacent to the film gate (Fig. 2). Since the crater image of the arc lamp, or the light spot emitted by the honeycomb condenser must always be larger than the film gate, a considerable amount of heat rays will be prevented from reaching the film track. However, it is essential that the film image is not framed

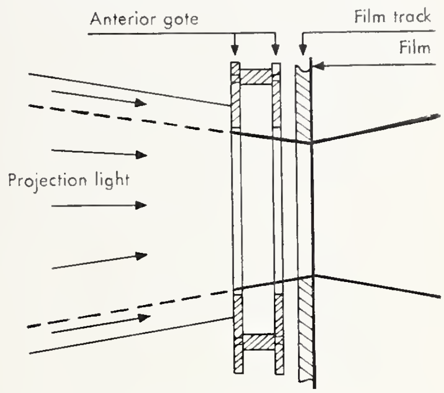



**FIG. 2. The anterior gate in the Ernemann IX.**

directly by the anterior gate, as it would transfer its considerable heat to the film if it were mounted too near the film track.

### Versatile Design

This design has now been further developed so that it can be used also for the new projection formats. The anterior gate is made of sturdy casting which conducts the absorbed heat to the lamphouse. This casting heats up considerably less than the former heat masks made of copper or iron.

The anterior gate contains a transverse slot into which a slide can be inserted which penetrates into the housing of the drum shutter. These slides are supplied with various cut-outs or turn-outs either to accept a film gate lens or to fit the different projection formats. They are easily exchangeable. This is of special advantage when normal or CinemaScope films are projected alternately either without a film gate lens or for short-focus wide screen projection with a film gate lens.

The new type has already been supplied for projectors with film gate lens. It is now made in mass production and can also be supplied for projectors with old supporting plates. The anterior gate, in conjunction with air cooling of the film, has the effect of keeping the temperature of the film track and the film low, another attempt at an optimum standard of performance.

† From ZEISS IKON "Bild und Ton," February, 1957.

### Spontaneous Combustion Again

Spontaneous combustion in the film storage room, which seems to have been having a field day lately, has been the cause for destruction of a library of priceless films stored by major motion picture companies in a vault at the United Storage Corp., Middlesex, New Jersey. Both positive and negative prints were ruined, damage running into thousands of dollars, actual loss estimate not immediately available.

Four volunteer fire companies fought the blaze for over an hour. The vaults occupied property formerly housing Pathe Film Laboratories. Spontaneous combustion has also recently been the cause of serious damage at the Allied Artists exchange in Omaha. (See IP, May 1957, p. 10).


Motion Picture Film Department
EASTMAN KODAK COMPANY
Rochester 4, N. Y.
East Coast Division
342 Madison Avenue
New York 17, N. Y.
Midwest Division
130 E. Randolph Drive
Chicago 1, Ill.
West Coast Division
6706 Santa Monica Blvd.
Hollywood 38, Calif.


Idyl hours... where anticipation and memory spell box office
New technics help give old tales new twists . . . raise new technical questions in production, processing, distribution and projection. In motters such as these, the Eastmon Technical Service for Motion Picture Film stands ready, willing and able to help. Offices are located strategically. Inquiries invited.
Motion Picture Film Department
EASTMAN KODAK COMPANY
Rochester 4, N. Y.
East Coast Division
342 Madison Avenue
New York 17, N. Y.
Midwest Division
130 E. Rondolph Drive
Chicago 1, Ill.
West Coast Division
6706 Sonto Monica Blvd.
Hollywood 38, Colif.

**The function of this department is to provide a forum for the exchange of news and views relative to individual and group activities by members of the organized projectionist craft and its affiliates. Contributions relative to technical and social phases of craft activity are invited.**

# *In The* SPOTLIGHT

THE WILL ROGERS Memorial Hospital Fund is understandably a highly worthy cause, and just as understandably gets good and plentiful notice in the trade press. But—and we think this complaint, too, is understandable—fund-raisers galore from all sections of the motion picture industry get due credit for their contributions . . . all except the projectionists. Now, in comparison with exhibitor contributions, the efforts of the projectionist craft may seem humble, but projectionists have cooperated cheerfully —we might say enthusiastically. And we think it unmindful of the trade press to so lightly brush aside these efforts. This is no gripe against a "small mention." There has been *none at all.*

Many projectionist groups throughout the country have inaugurated "copper drippings" campaigns in which their members devote much of their time after work to collecting these drippings from various theatres and converting them into cash. This cash is donated (note, please, without any publicity blasts) to the Will Rogers Memorial Hospital Fund. It is a method of fund-raising that is ingenious and particular to this craft, and it should be given some note.

The Will Rogers Memorial Hospital and Research Laboratories are now engaged in a program to study *all* chest diseases—that includes heart, lung, and cancer. It takes money. At this writing, an Audience Collections drive is being instituted for the Fund which is expected to be the biggest ever. All well and good, and we wish it every success. But in the meantime, IP sends its salute to those projectionist groups everywhere that are contributing quietly and effectively. And we hope that every now and then other members of the trade press will give due recognition to another worthy effort on the part of this craft.

• The annual mid-summer meeting of the IA general executive board will be held at the Sheraton-Mayflower Hotel, Akron, Ohio the week beginning Monday, August 26.

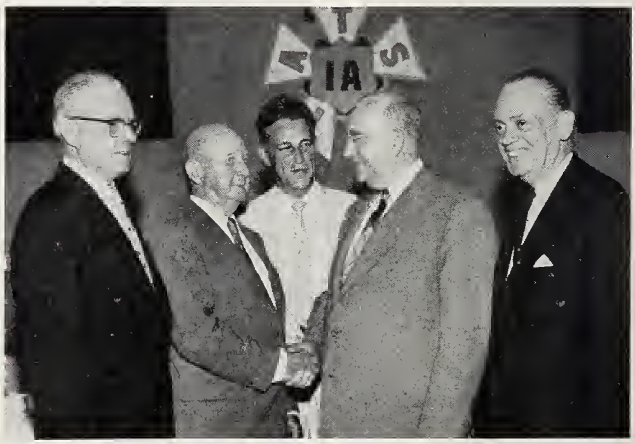
• Nineteen members of Kansas City Local 170 received 40-year membership pins at the Local's recent anniversary banquet. Also honored at the celebration were industry members who were awarded gold honorary membership cards. Representing the IA official family were President Richard F. Walsh, 8th Vice-President John A. Shuff, and Representative LeRoy Upton.

• New Haven Local 273 is very proud of its sponsorship of a group of handicapped Boy Scouts operating in the Greater New Haven area, known as Post-Pack Troop 3. Under the leadership of their late president, Maurice Moriarity, who endorsed this sponsorship back in 1954, the members have been very active in annual fund-raising campaigns for the Scout's Register Fresh Air Fund. Not only the members themselves but many of the wives are active supporters of this group.

• James V. Sipe, business representative for Pittsburgh Local 171, was unanimously re-elected secretary of the Tri-State Association, comprising IA Locals in Pennsylvania, Ohio, and West Virginia.

• Sorry, wrong name. Our attention was called to an error in a caption under a photo appearing on page 18 of our last—July—issue, in which we named one of

**PRESENTATION OF AWARDS AT KANSAS CITY LOCAL 170 PARTY**




Recipients of honorary gold cards in Kansas City Local 170, left to right: Lou Pope, purchasing agent for Fox Midwest Theatres; Samuel Victor, Local 31 (stagehands); George B. Barrett, Local 170 business representative; IA President Walsh, and Lester B. Isaac, director of exhibition for Cinerama Corp.

Veteran members of Kansas City Local 170 who were awarded 40-year pins. Seated, left to right: C. M. Summers; J. O. Bradley; B. F. Townsley, and George Denniston. Standing, left to right: H. H. Dunavan; E. F. Spies; E. F. Dougherty; F. H. Burkert, and E. H. Francis.

## IA OFFICIALS AT RECENT DISTRICT NO. 8 CONVENTION

John A. Shuff (second from left), IA 8th vice-president, presiding at the recent 8th District annual meeting at the Durant Hotel, Flint, Mich. Left to right: LeRoy Upton, IA representative; Shuff; John B. Fitzgerald, IA representative, and Harland Holmden, IA general secretary-treasurer.

the projectionists in the photo as the business representative for Louisville Local 163. Our apologies to Chester Demaree, who has held the office of business representative for the past five years.

• The IA has opened Canadian headquarters at 515 Jarvis Street, Toronto, with Hugh J. Sedgwick, IA 5th vice-president, in charge.

• District No. 7, comprising the states of Alabama, Florida, Georgia, Louisiana, Mississippi, North Carolina, and South Carolina, held its 29th annual convention June 17-18 in the Dixie Ballroom of the Henry Grady Hotel in Atlanta, Ga. Main speakers of the evening included IA President Walsh, Governor Marvin Griffin of Georgia, and President Wm. A. Cetti of the Georgia Federation of Labor. A. S. Johnstone, 6th IA vice-president, presided at the convention. Other invited guests included IA Representatives E. J. Miller of Houston Local 279; John N. Spearing of Jacksonville Local 511, and Maynard Baird of Knoxville Local 405. Frank (Bumps) Coogler, member of Local 279 was also present.

Among the important business transacted at the meeting was the adoption of a resolution in which it was proposed that the IA per capita tax be increased 25 cents per quarter; this increase to be placed in a separate fund and its use restricted to the purchase and operation of property in a warm climate for retired or disabled IA members.

IA Trustee R. E. Morris, secretary of Locals 142 and 519, Mobile, Ala., was unanimously re-elected District No. 7 secretary-treasurer.

The Atlanta host Locals provided the entertainment for the delegates and their wives, which included a luncheon and fashion show and a dinner-dance in the evening.

• Durant Hotel, Flint, Mich. was the scene of District No. 8's recent meeting. Delegates from member IA Locals in the states of Indiana, Kentucky, Ohio, and Michigan were addressed by General Secretary-Treasurer Harland Holdmen and other members of the IA official family.

• A panic in the auditorium of the Lincoln, Theatre, Lincoln, Nebr., was averted by the quick thinking of projectionist C. M. Woodhead, who kept the film on the screen when the stage curtain caught fire during a matinee showing of a feature picture. Woodhead, a member of Lincoln Local 151, remained at his post until the theatre was cleared of all patrons but by that time the intense heat of the flames blocked his own escape by the staircase, and the firemen had to rescue him from a ledge outside the projection room.

## DISTRICT NO. 7 HOLDS ANNUAL MEETING AT ATLANTA, GA.


Speakers' table at the recent District No. 7 convention held at the Henry Grady Hotel in Atlanta, Ga. Seated, left to right: R. E. Morris, District secretary-treasurer; W. M. Crim, Charles C. Mathias, secretary and treasurer, respectively, Georgia State Federation of Labor; J. O. Moore, president, Atlanta Federation of Trades; William A. Cetti, president, Georgia State Federation of Labor; Albert S. Johnstone, IA 6th vice-president; John N. Spearing, IA special representative, and IA President Richard F. Walsh. Standing in rear: E. B. Kinard, Atlanta Local 225, and temporary chairman of the convention, and Lee Evans, representative mayor of Atlanta.

• Present among the many distinguished guests at a recent 25-30 Club dinner was Bob Sanders, member of New York Local 306, now retired. This veteran projectionist claims the distinction of being the first man in the country to work with mechanical talking pictures. The time was "around 1910," and the place, the old People's Theatre on the Bowery in New York City. Exhib was an owner of an Italian restaurant, and the product was a one-reeler of Caruso singing an aria from "Pagliacci" . . . naturally. The phonograph ran off compressed air, and at times sync was not all that it should have been. And rear projection, too.

Sanders' long and varied career began circa 1906 when, without any experience, he talked his way into a job with the old Vitagraph company, which was showing in vaude houses at the time. Experience came rapidly and he took out his first road show—six reels of Sarah Bernhardt doing "Camille."

One of his biggest challenges was projecting in the old Madison Square Garden—a 38-foot square picture at what was then the longest throw going: 296 feet, 8 inches. This was done with 3/4-inch carbons at 70 amperes.

Touring the Midwest with the old Renfax system, Bob had to cope with, to say the least, some interesting projection set-ups. One mechanism had a clock-

*(Continued on following page)*

# News and Views from District No. 2

By HANK BOLDIZSAR

Member, IA Local 150, Los Angeles, Calif.

**Among other things, our West Coast contributor discusses herein several ingenious ideas developed by projectionists.**

THE average theatre goer seems to have a rather dim view of his neighborhood theatre projectionist. We gentlemen of the projectionist craft have earned for ourselves a reputation as "goofoffs" too busy reading or too lazy to care about the quality of the picture on the theatre screen. As a craft, I believe that we are sorely in need of good public relations to correct this popular fallacy.

I, for one, have always believed that projection rooms should be kept in tip-top shape and open for inspection by theatre patrons who might be interested in seeing how pictures are projected from films to screen. Projectionists should be neatly dressed on the job, wearing a uniform similar to that of a lab technician's, instead of looking like foundry workers. A friendly exchange of pleasantries between projectionist, manager, and the cash customer can do much to help business at the box office by stimulating the theatre-going habit.

### Projectionist Contributions

However, we do have among us projectionists who have contributed immeasurably to the craft with their inventions and improved methods of operation. As an example, consider Nels Matheson, member of Los Angeles Local 150, who for the past 27 years has made a study of carbon arc lamphouses and economy in carbon consumption.

Nels has been gainfully employed as a projectionist since 1923. He received his basic training back in 1918 while confined to a T. B. hospital in Banff, Canada, where he assisted the regular projectionist. In 1930, after the advent of sound pictures, Nels developed the idea of the electrical brush contact near the arc in the low intensity lamphouse. This was in line with the search for greater illumination of the then new porous screen required by sound picture projection.

Eventually, Nels improved on his own idea and introduced the first copper-coated positive carbon. Theatres in the Los Angeles area had been using his lamp modifications and tank-coated carbons for many months when representatives of a carbon company came, saw, and listened. This resulted in the worldwide use of "Suprex" carbons and "Suprex" lamps.

Continued research through the years in the all important quest for economy in projection operation brought about the development in 1955 of the first of a series of carbon savers developed by Nels—the Ejector Economizer. His latest effort, the Pin-Core, is presently being used in a number of West Coast theatres.

Another phase of carbon consumption is very close to the heart of Nels Mathesen. It is the Local 150 Memorial Copper Fund which, under Nels' guidance, has made substantial contributions to the Will Rogers Memorial Hospital. The exceptional success of the Local's copper drippings saving program is due largely to his determination to help victims of the illness that hospitalized him for more than a year and which nearly took the life of his own son several years ago.

My co-worker, Murray Price, has also come up with some ingenious ideas. Several years ago he was faced with the problem of replacing the completely worn out spot and flood lights in the New Follies Theatre, where we are employed. Both units were sorely needed for twenty-four 90-minute stage shows per week, and replacement had to be made at an absolute minimum of cost. Such restrictions called for considerable ingenuity and together with George Ghormley, his co-worker at that time, he met the challenge head on, and decided to build their replacement spot and flood with such used equipment as the theatre circuit had available.

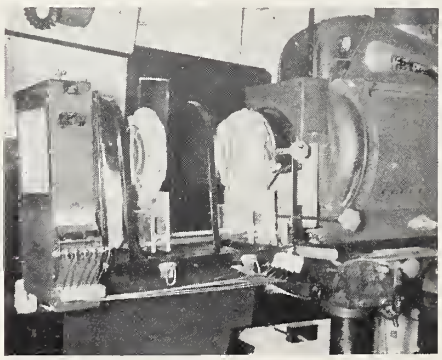


Photo shows spotlight with cover removed from lens assembly and cable control for Weaver gelatine slide holder.

With the assistance of Dave Chew, chief projectionist, they obtained two Ashcraft Model E lamphouses with 14" mirrors which they used as their light source. This make and model lamphouse was chosen because of the arrangement of the hand feed and alignment controls for the carbons. A lens assembly and housing was built and attached to the lamphouse. The forward unit of this assembly was a 6-inch diameter x 16-inch focal length lens, and the rear unit was a 6-inch diameter x 9-inch focal length lens.

### Rigid Assembly Tests

The assembly was subjected to endless tests during which no less than 16 lenses were tried until a perfectly matched pair was selected. An asbestos shield with a 1⅛-inch diameter aperture was located immediately behind the rear lens and about 27 inches from the mirror. A gear arrangement was installed enabling the front lens unit to keep the light in focus from a tiny pin spot to a 50-foot flood, with both a 5-inch iris and double choppers to cut off the light beam.

The units measure 55 inches long overall, are mounted on a three-point base and are adjustable from 4½- to 6 feet in height. The spot light, which is mounted on ball bearings, has a horizontal sweep of 360 degrees and a vertical sweep of 70 degrees. The unique feature of this spot assembly is the conversion of the carbon controls from the right to the left side of the lamphouse so as to make possible operation of the units from a center position. This was the only change made in the Model E Ashcrafts in converting them to the spot and flood light requirements of the New Follies Theatre. (The maintenance-minded projectionist will be interested to learn that both the spot and flood have been in operation for almost 10,000 hours without a single breakdown.)

Both flood and spot are equipped with a mounting for a 16-inch color wheel driven by a 2 rpm motor, hinge-mounted in order to permit the operator to swing the wheel alongside the lens housing when not in use. Each unit is furnished with a 6-section Weaver gelatin slide holder controlled by a cable arrangement with selectors at the operator's fingertips. These holders are also bracketed to accommodate such effect accessories

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*(Continued from preceding page)*

works shaft to the projector feed. Another had two heads, but only one lamp house.

Sanders worked the early Edison sound and film system, also. The disk-record set-up had the phonograph under the theatre stage steps, with a seemingly endless cord connecting back to the projection room.

This pioneer projectionist, now a grandfather, pleasantly commutes between Florida and New York. We'd call it a well-earned rest, although he remains a busy man, actively interested in projection and its problems.

# Projectionist License Exam Questions

BELIEVE it or not, there were some who took this section of a recent projectionist license exam and missed a question or two. This seldom happens, but the board has kindly allowed only 75 per cent as a passing mark. You should know all the answers, but if you want to check yourself, turn to page 28.

**1. The "master blade" of the revolving shutter:**

(a) keeps the film cool; (b) intercepts the lights as the picture moves; (c) blows the dust from the film, and (d) cools the pressure shoes.

**2. As the film passes through the picture gate:**

(a) it moves steadily and uniformly; (b) it stops at every frame; (c) it slows down and speeds up in time with the frames, and (d) it stops and starts at every other frame.

**3. A ventilator hood is attached to the top of every projector lamp house, or at least should be in order to:**

(a) keep the arc from getting too hot; (b) keep the film from warping; (c) carry off dangerous fumes and excess heat in the lamphouse, and (d) make operating conditions comfortable for the projectionist.

**4. The pictures are projected to the screen by a:**

(a) steady and continuous beam of light; (b) a beam of light moving with the picture; (c) beam of light from a source that is extinguished and turned on as the picture images pass before it, and (d) steady and continuous beam of light that is intermittently intercepted by an opaque shutter in time with the picture images on the film.

**5. A fuzzy appearance at the top or bottom of the screen picture is due to:**

(a) scratches on the film; (b) dirt on the film (c) lint and dust on the picture aperture, and (d) lint and dust on the sound aperture.

**6. Travel-ghost is:**

(a) the double appearance of an image on the screen; (b) the picture being out of frame; (c) the light streamers on the screen, extending up or down from highlight points of the picture, and (d) light streamers on the screen, extending up or down from dark points on the picture.

**7. Travel-ghost is corrected by:**

(a) adjusting the framer; (b) correcting the adjustment of the shutter blades with respect to the intermittent; (c) increasing the gate tension, and (d) decreasing the gate tension.

**8. A "blooping" patch is:**

(a) a patch of film cemented across a splice to make the splice stronger; (b) a square patch of dark opaque material or black opaque lacquer across the film; (c) triangular patch of dark opaque material or black opaque lacquer placed lengthwise along the soundtrack at splices, and (d) a similar patch to fasten the leader to the film.

**9. The *purpose* of the "blooping" patch is:**

(a) to make the splice stronger; (b) to prevent a "click" in the sound when the splice passes the sound aperture; (c) to preserve continuity of the picture images, and (d) to make sure the splice rides properly over the sprockets.

**10. The speed of motion picture soundfilm in the projector is:**

(a) 90 feet a minute; (b) 60 feet a minute; (c) 120 feet a minute, and (d) 100 feet a minute.

**11. The speed of film in a projector, in number of frames a second is:**

(a) 24 frames a second; (b) 16 frames a second; (c) 40 frames a second, and (d) 60 frames a second.

**12. One side of motion picture film is shiny —that is called the "base" side. The other side is more or less dull and is called the "emulsion" side. When threading film through the projector:**

(a) the base side should face the arc; (b) the emulsion side should face the arc; (c) the emulsion side should face the projecting lens, and (d) the base side should face the reflector.

**13. The ohm is the electrical unit of:**

(a) power; (b) energy; (c) resistance, and (d) current.

**14. The number of sprocket pins on the intermittent sprocket of a 35-mm projector is:**

(a) 12; (b) 14; (c) 16, and (d) 18.

**15. The number of frames which pass by the aperture every revolution of the intermittent sprocket on a 35-mm projector is:**

(a) 4; (b) 6; (c) 8, and (d) 10.

**16. The intermittent sprockets should begin to move when:**

(a) the master blade just starts to cover the opening; (b) the master blade covers the opening; (c) the cutoff or secondary blade just starts to cover the opening, and (d) the secondary blade covers the opening.

**17. The keystone effect is caused by:**

(a) the projector being too near the screen; (b) the projector being too far from the screen; (c) the projector being above or below the center of the screen, and (d) the projection lens not in focus.

**18. When threading up, the framing handle or device should always be placed in:**

(a) the extreme bottom position; (b) the extreme top position; (c) the center position, and (d) any position at all.

**ROBERT A. MITCHELL'S MANUAL OF PRACTICAL PROJECTION**

as cloud, rain, and lobsterscope.

There lamphouses, incidentally, using 7- and 8-mm trims and operating at 55 amps for a 90-foot throw, develop an excellent light output and are very versatile.

### *News from San Diego Local*

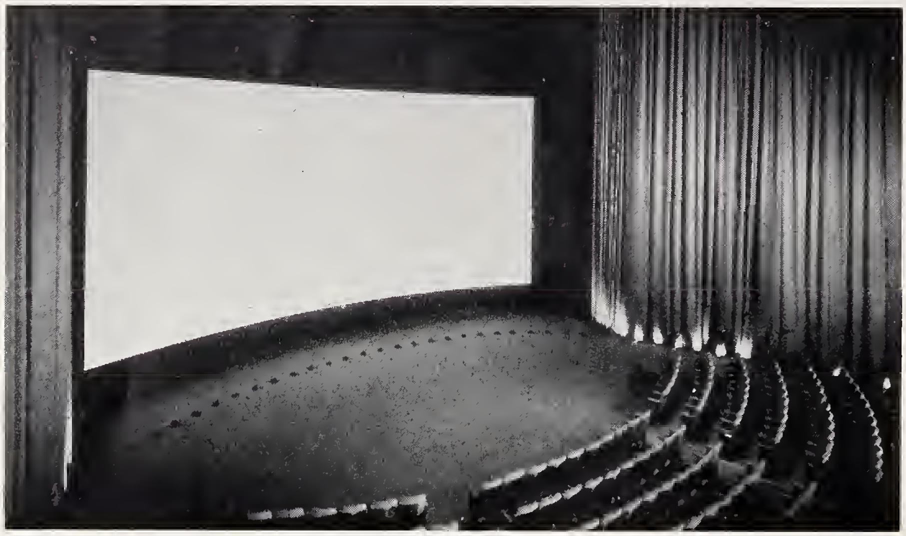
From down San Diego way we have news from Lou Alberts, press secretary for Local 297, telling us of the retirement of Doc Jonas. A native of Nebraska, Doc, or Clarence Charles Jonas, if you prefer the full handle, came to Los Angeles back in 1910, working at the Old Butler Theatre. L. A. had just initiated a licensing program for motion picture projectionists and Doc received the tenth license issued by the City of Angels. The following year, 1911, he moved south to San Diego and was the first projectionist to be licensed there.

In 1912, after working at the Pastime Theatre he left San Diego for a brief sojourn in El Centro, and it was during that time that Local 297 received its charter. Doc missed by a hair being a charter member of the Local he served faithfully for so many years.

Continuing with the saga of Doc Jonas —he returned to San Diego and was employed at the Cabrillo Theatre until 1917 when he enlisted in the U. S. Army. He was sent to the university of Arizona where he completed a course in electrical engineering with such an excellent record that he was retained there as an instructor until the signing of the Armistice in 1918. With the return to peacetime living, Doc returned to his old job at the Cabrillo Theatre in San Diego, transferring in 1929 to the Fox Theatre where he remained until his retirement in June of this year.

Doc's record through the years has been marked by loyal devotion to duty and personal good will to his employers, a determining factor in the pleasant labor-management relations that have always existed between the Local and the theatres where he worked. We join the membership of Local 297 in wishing him and his lovely wife, Bessie, much happiness and many years of pleasant relaxation.

**With "floating screen" installations already set in two locations, there has been some consideration of having the same in future Todd-operated theatres using 70-mm.**



The new Raytone Wondertone floating screen as featured in the renovated Selwyn Theatre.

# Floating Screen Considered for All Todd 70-mm Shows?

THE FLOATING SCREEN idea is not new. The audio-visual fields in education and industry have been using it for a quite a while. The celebrated showman Roxy essayed it 40 years ago at the old Astor Theatre in New York City. But recently it has come back into prominence due to another enterprising showman who is willing to try the tried as well as the untried: Michael Todd. On the first week of April this year, the old Selwyn Theatre in Chicago, with a new name and a new interior, opened to sell "Around The World in 80 Days" as best it could—if that show needs selling. New name: Cinestage; new interior: the "floating screen." Hard on this opening, another was made at the Astoria Theatre in London, England. Now Todd technical execs are pondering whether floating screen installations are to be used in all forthcoming Todd-operated houses where a 70-mm version is to be used.

### *Screen Masking Eliminated*

The floating screen (the new Raytone "Wondertone") eliminates all masking, and is situated without noticeable support. Accompanying this innovation is, in both theatres, probably the most elaborate and complicated stereophonic sound set-ups known. While the installations in England were primarily the work of one organization, Rank Precision Industries, Ltd. (as what is not in England?), constructions in Chicago were a cooperative affair. Extensive renovations, reportedly costing nearly $500,000, required almost a complete reconstruction of the theatre interior.

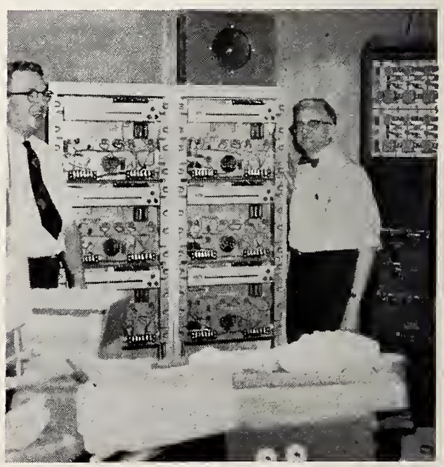
Architectural design is credited to the Bertrand Goldberg Associates firm, which does away with the proscenium, stage and fly galleries. What backlighting there is for the screen is provided with subdued light on black and gray surround drapes. Entirely new are the curtain tracks and electrical curtain control units supplied by Vallen, Inc., of Akron, Ohio. Clever facet of the new theatre design permits the patron to approach the interior of the theatre proper by way of two lobbies, each with "decompression chambers" of light, gradually accustoming the eye to the light on the screen.

The screen itself is a 26-by-52-feet Raytone "Wondertone," situated five feet from the back wall, five feet off the floor, and as mentioned, without visible means of support. The Wondertone is said to achieve the same sidelighting as a matte white screen, but affording 50 per cent greater light gain. It is seamless, washable, and tear-proof. A reported 23-foot lambert brightness level is attained with the Ashcraft Super Cinex lamps installed in the Cinestage projection room, these lamps utilizing about 150 amperes with Ashcraft 165-ampere multi-phase rectifiers. The initial problem of hiding the screen lacings was solved by bending the screen around the frame and lacing it in the rear, providing an all-round smooth surface for the 5-feet deep screen. The newly-built projection room provides a throwing angle of 3 degrees to aid in presenting a distortionless picture.

### *Altec Sound System*

The sound sytem is an outstanding feature. This includes a special control rack made especially by Altec (which handled all sound installation) for Todd-AO, and 55 speakers: 5 Altec Lansing stage speaker systems, and 50 Altec Lansing auditorium speakers. Sound equipment was provided in six-channel magnetic form (five channels for stage speakers) and in four-track magnetic or optical form for any required 35-mm projection. The control rack offers manual selection of six- or four-track recording. Machine outputs are fed to the appropriate preamplifier (mounted in the control rack) by means of relays on the rack, and push-buttton changeover switches mounted on the front wall.

Included is a panel permitting ad-



View of the Altec power amplifiers installed in the Cinestage Theatre by Altec field engineers J. Pesek and H. Smith. At the right is the complex changeover system.

## PERSONAL NOTES

W. J. TURNBULL has been elected executive vice-president and member of the board of directors of National Theatre

Willard J. Turnbull

Supply Co., the General Precision Equipment Corp. subsidiary. Turnbull joined NTS in 1933, and became manager of the Detroit branch in 1936. After serving in the Navy in World War II, he was appointed sales promotion manager. Since 1951 Turnbull has been vice-president in charge of eastern district sales for the company.

* * *

EUGENE S. GREGG, president of Westrex Corporation, has announced his resignation from that organization effective the end of August. He first joined Western Electric Company, Inc., parent company of Westrex in 1926 as statistician, and a year later was made chief statistician. From 1928 to 1941 he was associated with the former Western Electric subsidiary, Electrical Research Products, Inc., as European manager. In 1941 he was elected vice president and general manager of Westrex, and became president of the corporation in 1954. He has also been president and director of thirteen subsidiaries of Westrex, director in five others, and a director in seven other companies outside the motion picture industry.

Among other activities, Gregg is a vice-chairman of the United States Council of the International Chamber of Commerce, a member of the Board of Trustees of the Executive Committee, and chairman of the Committee on Commercial Policy. A member of the Travel Committee of the National Foreign Trade

Eugene L. Gregg

Council, Gregg has also devoted considerable time to the International Relations Committee and Advisory Group of the National Association of Manufacturers. Well-known throughout the industry, he has written numerous articles for general magazines, financial journals, and the daily press.

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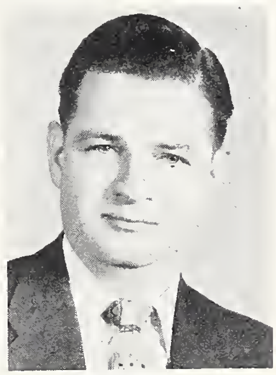
JOHN C. MILLIGAN has been appointed vice-president in charge of sales for Kollmorgen Optical Corporation. He will



J. C. Milligan

direct sales of all the company's products, which include many precision optical components for the motion picture industry. Previously, Milligan had been in charge of engineering administration for Kollmorgen.

* * *

MEADE BRUNET of RCA is now an officer of the Southern Cross (*Officer Cruzeiro do Sul*) by act of the Brazilian government. It is the highest civilian honor that government can bestow. The accompanying citation reads: "For your important contribution to the mutual understanding of our two countries."

Mr. Brunet is a director of RCA Victor Radio, S. A., the Brazilian affiliate which has contributed extensively to the country's economy by manufacturing and distributing electronic products. He is also a vice president and managing director of RCA International Division, Radio Corporation of America. He has been with RCA 35 years.

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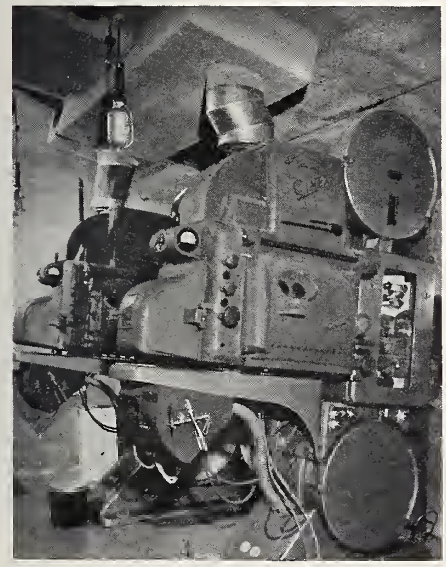
justment of volume of each magnetic track, and equalization to insure optimum response, so that all tracks of both machines may be balanced in output and quality. Master volume controls for stage and auditorium speakers, and monitor control for channel selection and monitor volume adjustment, permitting reproduction check of any or all channels, are part of the rack equipment. A power amplifier switching panel is available for selection of power amplifiers to insure freedom from loss of reproduction in case one of the units has temporary difficulty. Rack-contained power supplies (in duplicate) provide high and low voltage for preamplifiers, switching relays, and signal equipment.



Projection room equipment at the new Todd Cinestage: Ashcraft Super Cinex lamps, and the Todd-AO Phillips projector heads.

Amplifier response is flat, within 1 db. from 20 to 20,000 cycles. Noise level is 91.5 db. below rated power output.

Of the 50 surround speakers, 29 408A's are flush-mounted in the balcony; 20 601A's and one 604 C are recessed in the ceiling. Distribution of sound is by a 70-volt line with transformers at speakers for proper volume balance.

### *English Installation*

In the English installation, projection equipment is linked to 6 individual Gaumont-Kalee "21" amplifier channels, with sound from the screen coming from five large "Duosonic" speaker assemblies. There are more than 40 surround speakers located to the rear, above, and to the sides of the audience. The screen employed is the new Perlux.

With the amount of money and technical talent involved, the question of whether the "floating screen" is going to be worth it all is one that should, at least, be perplexing tech heads at Todd. The expense factor of new installations is something that will concern exhibitors also, albeit Michael Todd has never been known to be parsimonious where showmanship is concerned.

What Is YOUR Problem?

# Projection CLINIC

## Print Turkish Bath?

*We use a vaporizer on the rewind bench to steam prints after projection in the drive-in where I work. I have been told that a length of film, unrolled from the reel, will lie flat on the rewind bench when the correct amount of moisture has been absorbed by the film base. However, one steaming isn't enough to make some prints lie flat. Should I steam the film more than once?*

(1) PRINTS are not supposed to lie flat. (2) Steaming the film will do more harm than good.

Triacetate film base is incapable of absorbing moisture by the treatment described in your letter. The increasing brittleness of safety base is due mainly to the loss of volatile solvents which, once gone, cannot be replaced. As these special solvents escape, the film not only becomes brittle but undergoes shrinkage and warping.

It requires many days of storage in a cool, humid atmosphere to effect the return of even a small amount of moisture to film base. Momentary steaming accomplishes nothing but dampening the gelatine emulsion, which is hundreds of times more hygroscopic than the triacetate support. If the emulsion absorbs a sufficiently large quantity of moisture, it will swell and thus counteract the negative curl developed by repeated projections and by being wound emulsion-side-out. When this happens, the film will lie flat—but only for only a few minutes.

Because of the sensitivity of gelatine to water, *any* treatment of film with moisture is extremely hazardous. If the emulsion swells too much, the film may become curly, the emulsion will scratch easily, and the print may "stick" in the projectors, leaving troublesome deposits upon film runners, tension pads, and other film-contacting parts.

Even in long-term storage, an excessively high humidity may cause "spotting" by condensed moisture droplets and also favor the growth of fungus molds that make the emulsion sticky and gummy.

Emulsion which is thoroughly dry and hard has the greatest resistance to scratching, so we can't recommend any treatment that softens it. And not even all the teakettles in China can restore moisture to the *base* of the film!

## "Fybrglass" Scraper

*I am still getting that age-old trouble of tearing the film margins when scraping. Using either a wet or dry method, blades nick, and sandpaper leaves grit. Are there any other recommended methods?*

ADMITTEDLY it is difficult to avoid tearing the perforation margins at times when using moistened film and a razor, but perhaps you're bearing down too hard. Ease up a little, but make sure that all the emulsion is removed. It's an art. As far as sandpaper leaving grit, this shouldn't be a problem if the film is wiped carefully with a clean cloth.

There's another method around, if you want to take a tip from Sam Talarico, Local 529, Long Branch, New Jersey. He uses a Rush Fybrglass Eraser, and says it is just the thing for scraping film stubs. This eraser, complete with a supply of refills, is obtainable at most office supply houses. It's reported that the action of the spun glass on the film doesn't seem to nick the film base or tear the sprocket holes—and it can be used on either dry or wet film stubs. One recommendation is that it's especially good for roughing up the shiny side of the film to insure a good splice. The eraser feeds like a mechanical pencil: as the spun glass tip wears away, a turn of the top feeds more down. It might he helpful when you're in a hurry.

### Research Council Tip

During the recent field trips by the Motion Picture Research Council representatives, it was noted that a number of cases of film damage during projection were caused by insufficient clearance between the film and aperture plate.

Blistering of the emulsion can be caused by an aperture that is even slightly warped, and when caused by a below-standard-height plate, this damage is readily noted when the film is later projected through larger apertures.

The Council recommends as the best practice to use un-anodized brass apertures. Those that have been anodized should be dipped in hydrochloric acid and polished to remove the black finish. Checks should be made on all apertures to detect heat warpage.

## Grit Blowers

*Working a drive-in, we find that a great deal more grit and dust than we care for accumulates on the front lens element. Attempting to remove this with tissue is very liable to scratch not only the lens coating, but the glass itself. Is there an efficient method?*

SOME PROJECTIONISTS blow it off. This does *not* mean using your breath, which, of course, will moisten the glass. Any small producer of compressed air will do: atomizers, syringes, etc. The atomizers that commercial artists use to spray "fix" on pastels is usable. Joe Williams, Local 458 in Portland, Maine, where there is enough sand—says a small ear syringe is of great help. It gets all dust and grit off prior to cleaning with a lens tissue. Besides getting around the moisture problem, the syringe can also be used to remove any dust present in the lens barrel. Incidentally, this method has been used by still photographers with good results.

## Cement Decomposition

*We have been getting small spots on our lens which on examination turned out to be cement blisters. We have not been using alcohol, acetone, carbon tetrachloride or liquids that are ordinarily harmful to lens cement, and we have little discoloration that would indicate excessive heat.*

ALTHOUGH Canadian balsam, a natural resin, will discolor, the new synthetic resins resist high heat better. But they are sensitive to sudden temperature changes, and it is possible for them to decompose. This will cause streaks or small spots that look like dust particles. The film, of course, will absorb a certain amount of heat, but when making light tests, the shutter must be running. Any dirt or moisture on the lens may cause such a rapid absorption of heat as to even crack the lens under this concentration. Discoloration is not a complete indicator of over-heating of lenses.

It might be well to give whatever cooling system you are using a thorough check.

## LETTERS TO THE EDITOR

# The Sound and the Furor Dept.

*(ED. NOTE: In order that anybody who wished might have his innings, IP invited comment on Robert Mitchell's recent series of articles, "Film Standards for Picture and Sound." We can only say we asked for it. One of the first on our scene is projectionist James McGurran, Local 173, Toronto, Canada.)*

*To the Editor of IP:*

Robert Mitchell would have us believe that optical sound is out of this world. I would say in some cases it is. I have had plenty of trouble and complaints with optical sound with new film and good equipment, not to mention old prints.

Mr. Mitchell states that "if" the print is protected it will give good sound after a thousand runs. I agree . . . *if* the print is protected from scratches, dirt, oil, sprocket marks, aging of the film, and what-not.

The article maintains that each run of magnetic track produces loss of signal strength, and adds a little more noise. Well, we are now in our sixth month on one print of "Oklahoma!" (Todd-AO), it having had a few runs before we received it, and the volume control hasn't changed, nor can we hear any noise. The soundheads are still in good condition after 63 weeks of use.

For my part, I will take good, clean, magnetic sound. Why condemn it because the tracks wear? What doesn't wear out? Can't someone produce a coating to protect it from wearing out "overnight"?

I wonder if the audience knows the difference. I wonder if "Oklahoma!" wouldn't still be here in its 63rd week with no end in sight if it were single-track, perhaps piped through 3 or 4 channels. A gallon of water divided into 4 quarts is still a gallon of water to me.

Dramatic and Western motion pictures being the chief output today, the single track is okay, if we can guard against cracks, bangs, motor-boats, and a few other noises—as well as defects in printing. For a musical . . . you might as well put a Model T engine in a '57 convertible.

JAMES McGURRAN

## Robert Mitchell's Reply:

Mr. McGurran's observations are intelligent and correct, but he does not take into account the conditions which prevail in the average small theatre or the "punishment" which many of the prints received by such theatres undergo. Without small-town theatres, neighborhood and subsequent-run theatres, the motion-picture exhibition industry would collapse. The present unstable state of the business is, in fact, due to conditions which have forced many of the smaller theatres to curtail their operations.

I did not wish to give the impression that the optical tracks on present-day commercial prints are always satisfactory. They are sometimes very poor, *but needlessly so.* These prints cannot approach the quality of 6-track Todd-AO sound (the best sound ever in the writer's opinion), but that is a different matter. The majority of theatres will never use 70-mm film or six sound-tracks for high-fidelity stereophonic reproduction. Economic exigencies force the average theatre to employ 35-mm film and only one soundtrack. We should therefore like to see the single soundtrack improved as much as it could be and should be.

As I said in the article, I have heard purely amateur optical recordings on 16-mm film which are definitely superior to some of Hollywood's efforts on 35-mm release prints, optical *and* magnetic. I might also have given additional emphasis to the observation that European projectionists and exhibitors are complaining as never before about the poor quality of the sound in many of the films released by major American studios. Title music as recorded by one of the largest American studios is considered especially poor, and CinemaScope stereophonic orchestral recordings are regarded as "thin" and peculiarly unimpressive.

### Worn Reproducers

My thesis in the June article was simply that the full capabilities of optical sound are not being utilized, and that, if they were, optical tracks would noticeably surpass CinemaScope magnetic tracks in sound quality. An important factor is the worn and maladjusted condition of the penthouse magnetic reproducers in many of the theatres using them. Even with present-day print quality, optical sound is frequently much better than magnetic in such houses.

Magnetic reproducers do not tolerate neglect; and when in poor condition, give terrible sound—sometimes muffled, due to serious high-frequency attenuation, and often harsh and metallic because of severe harmonic distortion. It is a fact that neglected optical soundheads perform much better. I do not, of course, advocate the use of "any old print in any old machine," for sound cannot possibly be good under such conditions. But I should prefer an old optical-track print played on a neglected optical soundhead than an old magnetic-track print played on a neglected magnetic soundhead. Results from the former may not be good, but the sound produced by the latter combination is atrocious.

### The Todd-AO Difference

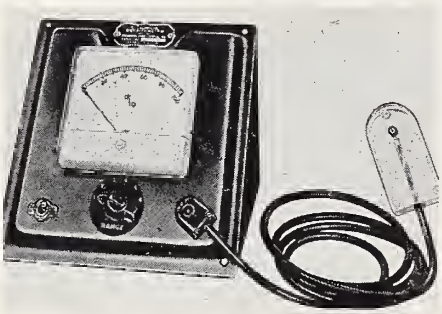
Let me say once again that by "magnetic tracks on release prints" I refer exclusively to CinemaScope tracks. Todd-AO presents an entirely different state of affairs in regard to track quality, the rate of film travel, and the extremely high quality of the sound-reproducing equipment used. Todd-AO magnetic sound is fully capable of level response from about 40 to 12,000 cycles; and the fact that the prints are *not* frequently shipped around from theatre to theatre, and are *not* carelessly handled or used on obsolete or wornout equipment, permits a long life without noticeable deterioration of the sound. But subject the Todd-AO prints to the *same conditions* which murder regular prints, and it would be quickly evident that 70-mm film is not a suitable medium for mass distribution of motion-picture entertainment.

In Todd-AO you have a *special process* —a "showcase" process which gives spectacularly wonderful results in picture and sound so long as it is given special (meticulously careful) handling. It nevertheless remains a fact, however, that the rank and file of movie theatres the world over use 35-mm prints exclusively, with optical sound, and will undoubtedly continue to do so.

The commercial facts of life in the exhibition business positively preclude a radical change in film or soundtrack standards. And one day, if the industry wakes up soon enough to save itself, it will be realized that "the play's the thing" and that the 35-mm medium is more than adequate to capture and convey the dramatic and emotional content of the better stories the screen so desperately needs. If the widescreen-stereophonic-sound trend toward complete depersonalization of the movies continues, more theatres will close, and studio cameras will soon grind exclusively for the picture tubes of home TV receivers.

# New Products for the Industry

Fotomatic Corp. of Indianapolis, Ind., has announced production of a new light measuring instrument, the Elwood Densitometer and Light Meter, model MA-1. The firm states that the instrument is ultra-sensitive for measuring light qualities and quantities. The self-contained unit houses a light sensitive crystal and a meter mounted in a cast aluminum housing. The crystal, attached to the meter by a cord and plug arrangement,



**The Elwood Densitometer and light meter, manufactured by Fotomatic Corp. of Indianopolis, Ind.**

is contained in a transparent plastic holder. Sensitive area of the crystal is ⅛ x ¼ inches, rectangular.

An extra attachment is a lens tube, into which the crystal probe may be inserted, allowing the unit to be used as a light meter for measuring small areas of light from a distance. Controls consist of an off-on switch and a sensitivity range switch.

Features claimed for the new meter include high sensitivity; stability to temperature and humidity changes; self-contained power supply; portable; unaffected by line voltage variations or electric fields; high color response; no amplifier tubes, transistors, resistors, condensors, or other electronic components requiring maintenance; requires no warm-up; inexpensive; and rugged.

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The Catalogue for 1957 Spring-Summer publications of John F. Rider Publishers is now available, listing new titles in the Rider "Basic" series — illustrative volumes dealing with basic subjects pertinent to power electricity, electronics, physics, TV, computers, and general electronics technology. With the catalogue, which may be obtained by writing the publishing firm at 116 W. 14 St., New York 11, New York, comes a leather book-mark stamped in gold.

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Recommended for lobby exploitation and similar uses, Robovision, manufactured by Oakton Engineering Corp. of Skokie, Ill., comprises a projector carrying two closed loops, one of pictures, the other a sound tape. The sound tape in turn carries two recordings, one of the sound to be heard and one consisting of inaudible automation signals The inaudible signals advance the picture tape to the next picture at suitable intervals. Operation and repetition can be set completely automatic. Picture brilliance permits effective use of the equipment in the most brightly lit lobby. The picture film carries up to 110 pictures; the sound tape can carry up to one hour of sound.

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A new illuminated 35-mm film cutter is announced by Richard Mfg. Co., 5914 Noble Ave., Van Nuys, Calif. The unit automatically advances film by 8 perforations when the self-sharpening knife handle is raised; film may also be advanced manually to any desired distance. Film is fully illuminated; three frame lines are always visible; frame line is adjustable. The new device, designated Model IT for "Illuminated Track," is intended primarily for cutting frames from 35-mm film for making 2 x 2 transparencies.

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J. W. Cosby, arc carbon sales manager for National Carbon Co., announces two new 13.6-mm high intensity "National" carbons for use in the latest reflector type lamps. Where the previously available 13.6-mm carbon was 22 inches long, the line has now been extended to include 18-inch and 20-inch lengths also. A new 7/16- x 9-inch "Orotip" cored negative carbon has also been developed for use with the two new positive carbons. "We . . . will continue to attempt to anticipate the demands created by new and improved projection equipment," Mr. Cosby declares.

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"Froil," a corrosion-protective oil, has been developed by Octagon Process, Inc. to provide a moisture and vapor-proof obstacle to corrosion, water displacing properties, and fingerprint removal. It is claimed that polished metal parts treated with Froil under humidity box testing have withstood 1005 humidity at 120°F. for more than two months without rusting.

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Technicolor, Inc., has put on the market a new combination viewer and lifetime storage box for 35-mm color slide at no extra cost to customers. Kodachrome, Anschrome, and Ektachrome color slides are being returned in the unique viewer slide box. With each 36 exposure roll processed by Technicolor, two viewer boxes arc being provided free.

Enlarging a slide six times its actual size, the box contains a convex magnifying lens in the base, recessed for protection. The package has a self-locking lid to keep slides free from dust and moisture, and to prevent light leaks. Molded from a new plastic formula developed for Technicolor, the viewer box has a specially finished area on the lid for writing pertinent data.

### Answers to Projectionist Exam

| | | |
|---|---|---|
| 1. B | 7. B | 13. C |
| 2. B | 8. C | 14. C |
| 3. C | 9. B | 15. A |
| 4. D | 10. A | 16. B |
| 5. C | 11. A | 17. C |
| 6. C | 12. B | 18. C |

## OBITUARIES

Katz, Lawrence J., 60, IA representative, died July 21 following a heart attack at his home in Harrisburg, Penna. He had been hospitalized for several weeks and had recovered sufficiently to resume his duties when he was stricken a second time.

A native of Harrisburg, Katz helped form the first projectionists' Local in that city in 1912, serving as secretary and business representative when it became IA Local 318 the following year. Since 1929 he served as president of Harrisburg Projectionists' Local 488, which came into being after a brief period of amalgamation with the stage employes' Local. In 1930 he was appointed a special representative of the Alliance, and a full-time IA representative in 1934.

For 10 years beginning in 1944, Katz served as secretary-treasurer of IA District No. 4. He held a number of offices in the Harrisburg Central Labor Union, and for 10 years was vice-president of the Pennsylvania Federation of Labor. During the depression, he was labor representative on the Harrisburg NRA Wage Board, and was later appointed to the Pennsylvania Rehabilitation Board.

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Shale, Rex, member of Toronto Local 173 for the past 10 years, died suddenly while at work on July 15. He was a member of the Famous Players 25-Year Club and of the Canadian Pioneers. He was also manager for 12 years for Perkins Electric & Theatre Supply Company.

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Thompson, Joseph M., 53, member of Local 285, Troy, N. Y. died recently. For the past 25 years he worked as projectionist at Proctor's Theatre in Troy.

## BOOK REVIEW

HANDBOOK OF SOUND REPRODUCTION, by Edgar M. Villchur, Radio Magazines, Inc., 1957, 217 pp., $6.50.

This comprehensive volume is a revised compilation of articles originally printed in Audio Magazine. The author, currently president of Acoustic Research, has put together eighteen readable chapters that cover sound from its basic principles to complexities of today's sound reproduction. (One entertaining chapter with appropriate early illustrations deals with the history of the phonograph.)

Although not "written down," this book, if read completely and carefully, should provide the layman with a good working knowledge of sound reproduction, always resting soundly on basic principles. For the enthusiast, practical instructions on selection of equipment, assembling, testing and measuring run throughout the book. Theory, of course, is treated in a fairly complete manner.

The text is fully illustrated, and each chapter contains a partial bibliography.

### Theatre, Local Biz Dependent

That the theatre is a community enterprise, and sales of local business establishments are dependent upon the local theatre is the theme of an illustrated talk being given to various business clubs by Larry Davee, sales manager and engineer of the Century Projector Corp. The lecture stresses the point that local businessmen should and must get behind the neighborhood theatre to promote attendance, thereby creating more sales for themselves through "window shipping" items, and making the theatre the hub of creating selling.

Davee plans to extend his talk, "The Value of a Motion Picture Theatre to Your Community."

### GPL Opens New Lab

General Precision Laboratory has opened a new testing laboratory building on its property at Pleasantville, N. Y. It houses equipment that creates extreme conditions of temperature, altitude, humidity, acceleration, vibration and shock. Purpose is to subject GPL products to the most trying conditions to see how well they stand up and where further improvement may be desirable. The new laboratory cost almost half a million dollars and took more than a year to build. GPL is a subsidiary of General Precision Equipment Corp.; other GPE subsidiaries include Hertner Electric Co., International Projector, National Theatre Supply and Strong Electric Corp.

## Hi-Fi Sets Standards That Theatres Must Meet

With high fidelity home equipment increasing the public's recognition of good sound reproduction, a competent theatre sound service organization is essential to assure finest quality reproduction in theatres, Edward Stanko, RCA Service Co. engineering manager, told the Washington convention of the SMPTE. Reduction of exhibitor expense, better patron satisfaction and efficiently planned service procedures high-lighted a ten-point servicing program which he recommended to the assembled engineers.

RCA's own procedure, the speaker said, included comprehensive technical examinations for the would-be servicing trainee, rigorous on-the-job training once assigned to the field, technical information channels between the national office and field personnel, and adequate refresher courses. The field force is on call 365 days a year, Stanko noted; every field engineer is equipped with an automobile, and every one is abundantly supplied with such special equipment as test films, degaussing apparatus, standby amplifiers, meters, switches and replacement parts.







## C'Scope Newsreel Delay

Since the announcement that the 20th-Fox Movietone newsreel would be henceforth issued in CinemaScope black-and-white, some major problems, both technical and commercial, have arisen. Crux of the impasse is the fact that 20th has various commitments that preclude the possibility of CinemaScope prints.

Important among these commitments is the United Press TV contract, and various foreign markets that must necessarily be supplied with regular process product. Then too, freelance material that is bought by Movietone invariably is in 2-D.

An immediate solution would be to have events shot in the two versions, CinemaScope and standard, but the expense encountered just as immediately rules this out.

Squeezing a normal shooting into CinemaScope proportions is not considered much of a problem, nor is unsqueezing, but the time factor is paramount. Unsqueezing procedure involves scanning the CinemaScope negative frame-by-frame, eliminating all but the central important information.

Putting the expense factor aside for the moment in favor of promotion purposes, 20th-Fox has unsqueezed a sizable amount of footage for TV presentation, with an eye to the forthcoming tollvision projects.

### New Film Cleaner

A cleaner, better show is said to result from use of a new film-cleaning and film-conditioning solution. The solution performs three separate functions. First, it is a cleanser, said to remove from the film grit, dust, lint, grease pencil marks, grease cue marks, masking tape residue, fingerprints and oil. Second, it conditions the print. Green, sticky prints are instantly seasoned and prepared for immediate projection without chattering, sticking, damage to perforations or emulsion pile-up. By periodic application of this solution, all prints are kept in flexible and relaxed condition, protected against becoming dry and brittle, it is claimed. Finally, the solution embodies non-static ingredients that repel dust or dirt particles.

The solution dries immediately without streaking, clouding or leaving visible residue. Its fumes are harmless and non-flammable. No special ventilation is needed where it is used. Trade name is Sosolvex; vendor is S.O.S. Cinema Supply Corp. of New York and Hollywood.

## SUPER CINEX LAMP

(*Continued from page* 15)

flector, 13.6 carbon Super Cinex. I had every reason to believe that it was the ideal light source for large theatres and drive-ins with oversize screens, but the proof depended upon actual installation where the value could be determined, and any mechanical electrical defects corrected.

I am exceedingly grateful to those men in the projection field who recognized the possibilities of this new lamp and cooperated to the limit in assisting me in making the Super Cinex lamp and the new 12-phase selenium rectifier, which we later designed, what they are today.

Prior to 1933 our company depended upon the manufacture of condenser-type lamps for the major part of our business, gradually discontinuing its manufacture in favor of the elliptical reflector type. It is true that until recent years it has been the standard in large theatres and motion picture studios. It had many good features—particularly better light distribution giving a more perfect field than our earlier reflector lamp using small carbons. It also, due to its comparatively low and limited optical speed (*f*/2.0) and use of larger carbons, was less critical than our older reflector lamps.

### *Large Screen Advent*

With the advent of large screens it became recognized that its light output even at high currents with special and expensive carbons left much to be desired. Mechanically it was excellent and did a good job as long as screen widths were limited to 24 x 26 feet.

The first to recognize the possibilities of Super Cinex as a means for the increased illumination of larger screens with better distributed light and with the same or better stabilization was John Kohler of Loew's Inc. Being dissatisfied with his light at the Capitol Theatre in New York City, he approached me as to the possibilities of Super Cinex. As a result, we worked together for many weeks in our laboratory, making comparative tests and modifying the lamp and rectifier in order that it would operate long hours at high currents without mechanical or electrical failures.

In October 1956 a complete installation of three Super Cinex lamps and three 12-phase 165 ampere rectifiers was made. The result—the screen light was doubled and the operating expense cut in half. Since that time, and before the lamp was placed on the market, several minor mechanical improvements were made. We felt that since a long hard field test should be made, the Capitol was an ideal theatre for proving the ruggedness and dependability of this new lamp. This has paid dividends for both the many theatres using Super Cinex and our company. All bugs were discovered and corrected, resulting in a minimum of annoyance and maintenance expense.

### Photo Research Corp. Contracts

A patent license has been granted to Photo Research Corp., Hollywood, in an agreement between the electronics and instrument firm and RCA. Karl Freund,

well-known inventor in the light-measurement field and president of Photo Research announced that the license agreement covers certain aspects of Electrofax, a new improved process of magnetic printing.

### Altec-VA Tie-in

Altec Service Co. has announced closing of a contract with the Veterans Administration. The agreement provides that Altec field engineering personnel throughout the United States will service VA motion picture sound equipment, and centralized radio equipment.

## TV & MOTION PICTURES

(*Continued from page* 12)

storage itself means that this system is capable of producing brighter images than may be obtained with CR tube systems of image production. Use of an outside light source removes the brightness limitation that is found in the ordinary cathode ray tube projection system and allows any brightness to be used.

### *Future Modifications*

Several modifications must still be made to this basic system before a workable system is evolved, since the light projected to the screen in the example just described is only a portion of one line and there is no vertical scanning present as yet. The modulations caused by the television signal travel down the light cell as they come from the crystal plate.

This motion of the lines of light caused by the vibrations in the liquid must be stopped by introducing some type of equal and opposite motion. It is necessary to stop this motion in order that the picture will remain stationary on the screen. A many-sided mirror made of stainless steel is so rotated that its faces act like tiny plane mirrors moving one after the other. This arrangement is called the high speed scanner. It is rotated by a motor. The speed of the scanner is dependent upon the number of small faces or individual mirrors it contains. The light coming from the projection lens (after having passed through the light cell) passes to this high speed scanner and then to the theatre screen. Since the motion of the scanner is made equal and opposite to the motion of the waves in the light cell, there appears to be no motion of the waves as they appear on the screen. All that appears on the screen is series of vertical lincs, some dark and some light, which are used to form part of a picture line.

The action of the high speed scanner does the same thing for the supersonic system as Horizontal Hold does for a conventional TV system. If the scanner is not adjusted properly the picture will have a tendency to move either to the right or to the left just as an ordinary receiver would do if the Horizontal Hold were misadjusted.

### *Vertical Scanning*

Finally, to produce the complete television picture a method of vertical scanning is also needed. Proper vertical scanning will arrange the separate light pictures on the screen as a series of individual lines. The vertical scanner (also known as the low speed scanner) is likewise a rotating cylinder madeup of many flat sides. Each of these flat sides acts as a plane mirror which will move the individual lines vertically on the theatre screen. Just as the high speed scanner acts like the conventional Horizontal Hold control, the low speed scanner acts like the conventional Verical Hold control. If the low speed scanner is operating

at the wrong speed, the picture will move up or down the screen, just as in the case of improper Vertical Hold adjustment in the conventional system.

The high speed scanner has been operated at about 45,000 revolutions per minute and the low speed scanner at approximately 340 revolutions per minute. Both of these figures, however, depend upon the number of mirrors contained in each scanner, as well as the number of lines and frames in the television systems. Both scanner motors must be kept in synchronism with the rest of the television system. This presents some difficulty in design since unusual procedures must be followed in order that the normal sync signal may have sufficient aplitude to synchronize an electric motor.

[TO BE CONTINUED]



## 20th-Fox Policy Takes

61 small town and subsequent-run theatres have reopened due to the recently inaugurated aid-to-small-theatres policy of 20th Century-Fox, according to initial reports from Alex Harrison, general sales manager of the firm. Reopened houses have been shuttered from one to more than two years.

Harrison's report also indicated that a number of sub-runs, mostly in Canada, have successfully converted to first run. This is hoped to provide additional outlets for absorption of 20th's expanded 55-picture release schedule this year, currently getting a strong publicity barrage.

Included in the reopenings are 17 U.S. exchange areas, Minneapolis territory setting the pace with 10 unveilings.

## TELECASTS

(*Continued from page* 16)

projector with a 3000-watt bulb running on 110-120-volt AC which claims to give as much light as the carbon arc projectors now in TV use—around 6000 lumens. The light is projected through a series of lenses to dissipate heat and increase brightness. The projector is run by remote control, and will feed 60 slides in as many seconds.

The company also employs the new GPL projectors (see Telecasts, IP, February 1957) in its closed-circuit group communications systems.

The latest innovation in the TelePromTer device itself is a wireless control, that allows the operator to control the speed of the 'prompter from any location in the studio. Previously this was accomplished by a cable between switch and prompting device.

Projectors may now be started electronically by a speaker's voice, due to a TelePrompTer development called Telemation. Wired to the 'prompter, the device closes a circuit when a speaker reaches a cue word, and speaker and projector are in synchronization. The company claims no possibility of error or mis-timing.

### New RCA TV Service

THREE new closed-circuit TV producers are being provided with supervisory engineering services by RCA Service Co. Inc. They are Medical Radio and TV Institute, Inc., Closed-Circuit Telecasting System, Inc., and the TelePrompTer Corp. Contracts call for the assignment of RCA Service Co. field engineers at many closed-circuit telecast reception sites.

Telecasts for Closed-Circuit Telecasting System, Inc., will initiate use of RCA's newest full color TV projector, the TLS50 (see Telecasts, IP, May 1957), and associated closed-circuit equipment.

RCA has also announced development of four new horizontal-deflection systems to be used with 110-degree type TV picture tubes, considering that 110-degree deflection makes possible a reduction in both tube length and weight. The horizontal-deflection systems have high voltages of about 14, 15, 16.5, and 18KV at zero beam current.

The systems claim sufficient scan reserve, good raster geometry, minimum spot distortion, and sufficient "shadow" clearance.

## A BRIGHTER PICTURE

(*Continued from page 9*)

sired requirements of sprocket motion. Although used principally in 16-mm apparatus, there is no reason why they should not also be employed in 35-mm machines for more rapid film pulldowns.

Attention must be paid to the oscillating-cam geneva movement, of which the system employed in the Hortson projector is a good example. This utilizes an oscillating cam with an 8-slot geneva star wheel and a drunk cam. One version of the oscillating-cam movement is now in TV use—the mechanism developed by J. G. Jackson and incorporated in the new RCA color TV projector to answer the problem of accommodating the standard cinematic film rate of 24-frame/sec. to the TV 30-frame/sec. This is shown in Fig. 6. (See also, IP, February 1955, p. 7 *et seq.*)

What is probably considered the most promising method for increasing the pulldown rate is an accelerated geneva movement that employs an offset drive shaft and a "slipper block," as shown in Fig. 7. Here, the metal slipper block, which is actuated by the cam pin, is allowed to slide in the slotted disk. The principal of offset drive lends itself especially well to pulldown acceleration, and has already been successfully used in 16-mm operation. One large advantage to this system is that the velocity of the pulldown is not instantaneous.

Developments now in progress would seem to indicate that designers prefer the offset drive accelerated system. But whatever method holds the key to the problem of brighter, flickerless pictures, it is certain that the geneva as we have it today is no longer satisfactory, and the time to change is now.

## FOCUS DRIFT PROBLEMS

(*Continued from page 13*)

projection rooms must be equipped with some type of visual aid, such as binoculars of a magnification factor of at least 4. A wall or projector-mounted telescope may be more convenient, but at least something must be provided to bring the screen as visually near to the projectionist as it is to the nearest member of the audience.

An item which seems to have been overlooked is the setting of the astigmatism adjusting ferrule provided by cylindrical anamorphic attachments. The optical manufacturer furnishes precise instructions for the initial setting-up of this adjustment, but it is entirely possible for the locking ring to work loose, and the ferrule to move from its previously determined position.

Then too, it is possible that a better setting may be found. Users should bear in mind that the preferred distance setting will be that figure which results in both vertical and horizontal lines going in and out of focus at the same rate and time. The writer has observed several projectionists attempting to make this setting by moving the astigmatism ferrule while observing the effect on the screen. It is much better to follow the manufacturer's suggestion: to set in the nearest figure coinciding with the projection distance from lens to screen center. After this initial setting, slight deviation may result in better stability of focus throughout the reel.

The reader may wonder if the above statement can be proven. Unfortunately, the writer has no data which will make a case that focus drift can be more noticeable when the anamorphic attachment is not properly adjusted; yet in several instances where severe focus troubles have been encountered, definite improvement has been obtained by the application of several of the measures we have mentioned here.



### SMPTE Sound Course Ends

The Sound Recording Course jointly sponsored by SMPTE and IATSE Local 52 NYC which began in February closed with a panel meeting June 12. A dinner preceded the meeting, presided over by Edgar Schuller, chairman of the SMPTE New York Education Subcommittee on Sound Recording.

Panel members included: Robert Engler of Westrex; Raymond Griswold of RCA Film Recording; Edwin Dickenson of Westrex; David Blumgart of Information Productions; James Shields of CBS; Nicholas Cook of Public Gas & Electric; Richard Pietschmann of Louis de Rochemont-Cinemiracle; Jack Leahy of RCA Film Recording; George Lewin of Army Pictorial Center; Theodore Lawrence, consultant; Homer Elder of Metropolitan Sound; Christopher Lankester, United Nations; John Maurer of JM Developments; Burt Perry of Westrex; William Jordan of Movietone, and Emil Neroda of Reeves Sound Studios.

# The Lunatic wept

ABRAHAM SIMMONS couldn't feel the frost that lined his tiny stone cage, or taste the swill they fed him, or chafe at his iron chains—so his keepers said. He was a madman.

But then, when his visitor, little Miss Dix, spoke softly, kindly, to him, why did he weep?

Dorothea Lynde Dix knew why. And her knowledge kept her fighting all her life to get the mentally ill away from pits and cages, whips and chains, and into hospitals.

In nearly 40 years, she paused only once—to render heroic service as superintendent of nurses in the Civil War. Then again she began investigating, writing, fund-raising, politicking, until this frail ex-school teacher had pushed a whole country into one of the finest reforms in its history: the sane treatment of the insane.

Dorothea Dix was fortunate in having one powerful ally: the American people. For as history will show, Americans are seldom self-satisfied; they long to do right. That urge has helped them build a strong, stable nation in a troubled world—and it has helped make their country's Savings Bonds a rock-ribbed assurance of security.

The will and purpose of 168 million Americans back U.S. Savings Bonds, back them with the best guarantee you could possibly have. Your principal guaranteed safe to any amount—your interest guaranteed sure—by the greatest nation on earth. If you want *real* security, buy U.S. Savings Bonds. Get them at your bank or through the Payroll Savings Plan where you work. And hold on to them.

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# INTERNATIONAL PROJECTIONIST




SEPTEMBER 1957

VOLUME 32 • NUMBER 9

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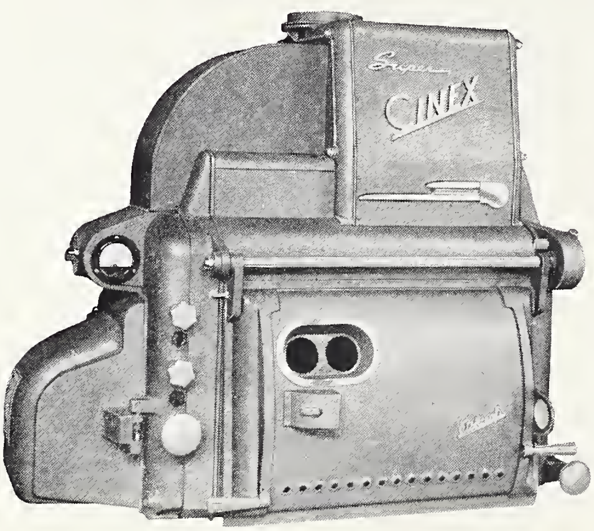


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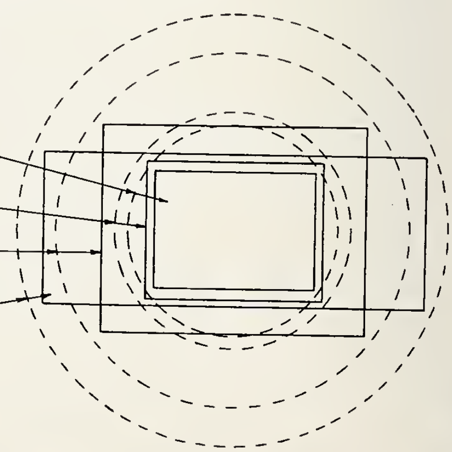
| .839 x .715 / .912 x .715 CinemaScope 35mm | 42,000 | 2 |
| 1.340 x 1.06 Fox CinemaScope 55mm | 49,572 | 3 |
| M.G.M. 65mm / Todd-AO 70mm | 45,200 | 4 |



**The quality and f value of the projection lens may increase or decrease these values.*

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R. A. ENTRACHT, *Publisher*
ROBERT C. MacLEOD, *Editor*
R. A. MITCHELL, *Contributing Editor*

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# Monthly Chat

## The Uses of Adversity

IF, AS THEY SAY, some controversy is healthy, we have been enjoying excellent health these days. Among this month's pages you will find some disagreement with Robert A. Mitchell's recent series of articles, "Film Standards for Picture and Sound." This—all respect to Mr. Mitchell—we encourage, because it gives us an opportunity to show that technicians in this craft are thinking about it. And, we hope, doing something about it. The palmy days have long been over, and it only by the give-and-take of informed and experienced minds that we can contribute to the advance of an industry that sorely needs it. There are still too many lethargic members of this business who are willing to let George do it. Well, George doesn't live here any more. Granted that if a projectionist has a third-rate picture to show, he's got a third-rate picture to show, and we're all hung. But technically speaking—and that is what we're here for—the dissemination of information is the most valuable thing we have to give to each other. So any time you're in the mood, drop us a line.

## Care of Screens

OUR MAIL seems to run in patterns. A while back we received a number of letters on the care and cursing of release prints. Now as summer wanes the topic in the mailbag is screens—accent on cleaning. We plan to publish something on this in the future, but whether he is responsible for it or not, we feel that the efficient projectionist should have what data necessary on screen maintenance as a matter of course. This is obtainable from the manufacturer. Even if you have licked the problem of better light, smoke, fog, discolored lenses, etc., there is always the chance that some mother's darling is going to use your hi-gain as a target for his candy bar. And it's happened too often that subsequent cleaning has made matters even messier. For his own peace of mind, we urge the projectionist to have information concerning recommended procedures on screen care at hand.

## Pay-TV and All That

WHAT HAS come to be known as the Bartlesville Experiment went into operation early this month. The Oklahoma town was the first to receive subscription TV through cables from a central studio. Now that pay-TV has brought first-run product into the home, whither the established motion picture theatre? No one knows whether the public is going to go for pay-TV (Bartlesville teed off with a modest 300 subscribers, with more to come), but it seems to bode no good for the neighborhood theatre—and, what is more to the point, the personnel employed in the house.

It has been stated that pay-TV will stimulate production; it has been stated that the exhibitor will get his share from subscription: *but* it has not been stated just where the projectionist fits into all this.

We'd like to have some information on that point.

INTERNATIONAL PROJECTIONIST

Volume 32 SEPTEMBER 1957 Number 9

# TV Projection and the Schmidt System

By ROBERT MacLEOD

**Among the TV projection systems that have been utilized in the rapid growth of that technique, the Schmidt system is perhaps employed more often than any other, and it has performed well.**

THE RECENT rash of publicity concerning toll TV has brought some prominence, in the technical world, to the role of the TV projectionist and projection equipment. Prior to the advent of tollvision, closed circuit TV has been in wide use in the industrial and educational worlds, and its growth in a variety of fields shows no sign of slackening. A number of manufacturers have produced TV projectors, and a number of projection systems have been tried. Prominent among these have been modifications of the Schmidt optical system—a system designed to correct aberrations as much as possible, yet still retain a large field of vision and high luminosity. It is a system projectionists should be familiar with, if they have not already encountered it.

## Optical Aberrations

There are six major optical aberrations that must be considered in TV projection: chromatic and spherical aberration, curvature of field, coma, astigmatism, and distortion.

*Chromatic aberration* is mostly of concern to the projection of color TV. This defect splits up white light into its component colors, so that violet will be brought to focus before red, etc. This creates the situation where the image will be in focus in many positions, not just one. It can be corrected by use of achromatic lenses—one concave and one convex, creating an equal and opposite effect.

*Spherical aberration* is an important defect, one that is intrinsically part of projection. It produces a blurred picture, because light rays passing through the edge of a lens bend more sharply and their focal point is closer to the lens than that of light rays coming through the center. This can be corrected by using lenses with non-spherical surfaces, called aplanats.

*Curvature of field produces* blurring at the edges of the picture. It occurs when a flat subject is imaged on a curved surface. The distances between a lens and film are not the same at all points, since the lens is curved and the film is flat. It can be cured by having the object curved toward the lens. The curved surface of a TV tube is an illustration of this corrective principle.

*Coma* produces a comet-shaped image, hence the name. It is caused by light rays hitting a lens obliquely, and is a form of spherical aberration, except that the blur is not symmetrical.

*Astigmatism* reproduces a point source of light as crossed lines, at right angles to each other, and separated at different distances from the lens. This defect in the human eye is noticed when distance lights appear not as dots but crossed lines. It can be corrected by a number of ways with an astigmatic lenses.

*Distortion*, basically, occurs when the image is not given uniform magnification. Consider the trick mirrors in an amusement park. If they make you appear short and bloated, that is a form of "barrel" distortion. If they make you appear tall and emaciated, that is a form of "pincushion" distortion.

## Compound Lens Problem

Because of the presence of these aberrations and distortions, projection requires not just a simple lens, but a series in combination. And while it is true that the more lenses used will result in a better picture free of aberrations, it is also true that there is greater light loss. And, in correcting one aberration, another may be magnified. It is impossible to correct all aberrations at once just by combining

lens of various shapes and types of glass. The problem, then, is to eliminate as much aberration as possible, but retain a high light intensity. The Schmidt system has come close to achieving that end.

### *Diaphragm and Spherical Mirror*

In 1931, B. Schmidt, an instrument-maker for the Hamburg Observatory in Germany, invented the optical system that bears his name. His first step was to employ a hollow spherical mirror, which has two major advantages: a mirror does not have any chromatic aberrations, and—all things being equal—has a spherical aberration eight times smaller than that of a simple lens.

A diaphragm was placed before the mirror, in a plane passing through the center of curvature, as shown in Fig. 1. This arrangement is such that, since each incident ray has the same relation to the diaphragm, the direction of each ray is the optical axis. Thus

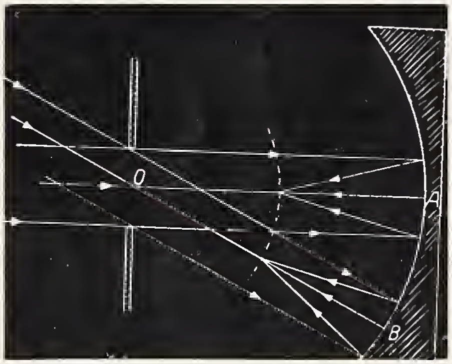



FIG. 1. The spherical hollow mirror, with the center of curvature at *O*. The parallel rays *A* and *B* produce the image field section of sphere indicated by the broken line The radius here is one-half that of the radius of the curvature.

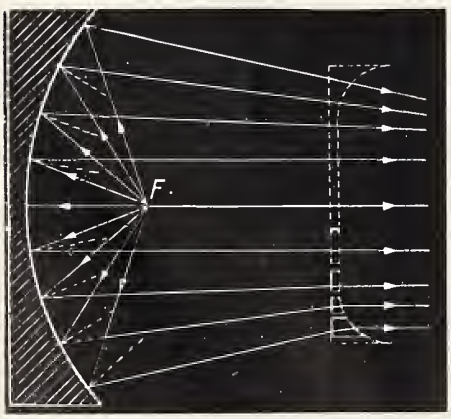
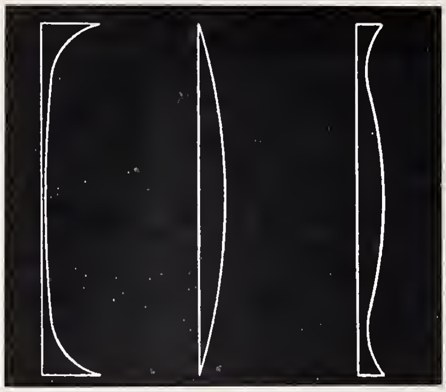



FIG. 2. The effect of the correction plate. The top half of the illustration indicates ray direction without the plate, producing spherical aberration. The bottom half shows parallelism of the rays caused by the corrective elements.



A B C

FIG. 3. *(A)* Schmidt correction plate. *(B)* Flat-spherical lens. *(C)* The plate and lens combined. The thickness of the combination has been exaggerated for schematic purposes.

coma and astigmatism as related to the diaphragm plane are eliminated.

The image field formed by beams of parallel rays is spherical, with a radius one-half that of the radius of the curvature. Although the image field is curved, curvature of field is negligible, since the face of the cathode-ray tube in the TV projector is spherical.

### *The Correction Plate*

But spherical aberration remains. To correct this, Schmidt designed a correction plate, to be used in the diaphragm. (See Fig. 2.) The source of light is placed in the focus of the mirror, and, as shown in the top half of Fig. 2, without the plate the greater the angle between the incident ray and the main axis, the more the divergence from the parallel to the main axis.

But with the correction plate—a thin, continuous surface of small glass prisms—this spherical aberration is eliminated, as shown in the bottom half of Fig. 2. (For schematic purposes, the thickness of the corrective element is greatly exaggerated.) To maintain the aberration-eliminating advantages, the plate is placed in the center of the mirror, as in the previous diaphragm application. While the plate is not perpendicular to the edge incident rays, refraction of a ray in a prism is very little dependent upon the angle of incidence. It must be borne in mind that the optical strength of this system is supplied by the mirror, and the plate is only to correct the image.

One distinct advantage of the Schmidt system is that it can be used with a much larger aperture in relation to the focal length than that of a lens system. This is because the boundary rays striking a lens system pass through a different thickness of glass, causing a change in the image.

Some chromatic aberration is found with the correction plate. While the mirror produces none, the corrective element is refractive, thereby causing different deviations of rays of different wavelengths. However, the differences in thickness of the plate are very small, so the amount of aberration is also small.

### *Plate Construction*

The cross-section of the corrective plate as shown in Fig. 2 is not desirable, as the value of deviation must be kept as small as possible to avoid chromatic aberration. Since the edge slope must be countered with a middle slope in the opposite direction, a flat-spherical lens is combined with the original correction plate, as indicated in Fig. 3. It is to be noted that now the slope at the edge has been reduced, and the flat minimum previously in the center of the plate is near the edge. Rays passing through this area are not refracted. The focal effect of this combination corrective element is dia-

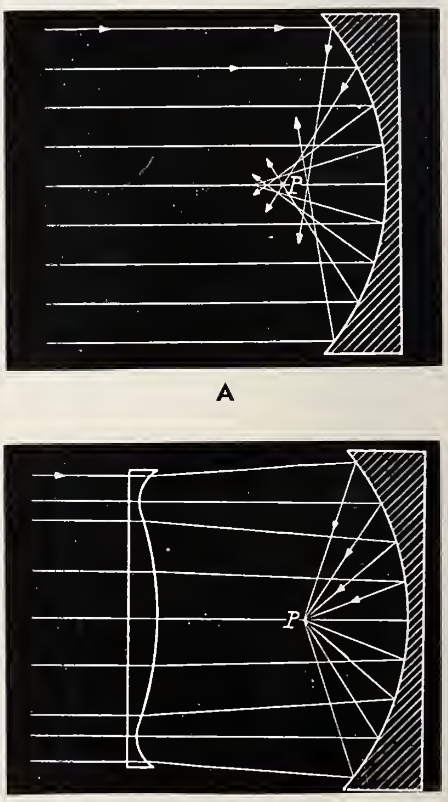



FIG. 4. *(A)* spherical abberation with a number of focal points. *(B)* The effect of the correction plate: a common focal point, *P*.

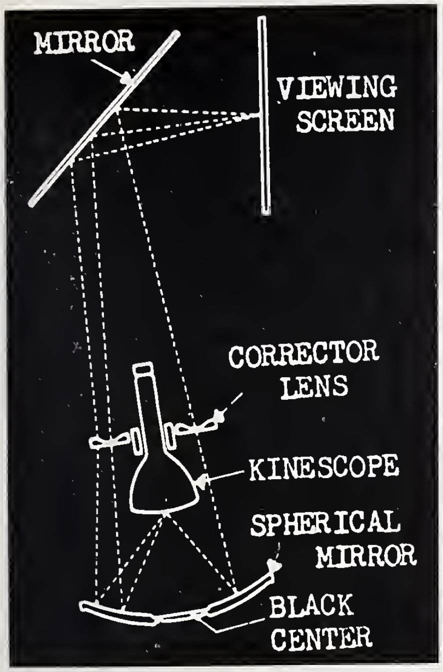



FIG. 5. Straightaway Schmidt projection system employed in the RCA Models 648PTK and 8PCS41.

grammed in Fig. 4, showing a common focal point.

### *TV Applications*

There have been several modifications of the Schmidt system for TV projection on the market, one being shown in Fig. 5. This straightaway set-up was used in the early RCA Models 648PTK and 8PCS41. It consists of the spherical mirror, with the center painted black to avoid any light reflecting back onto the face of the cathode-ray tube, which would reduce picture contrast. In other modifications, the center portion of the mirror is cut out.

The tube is mounted face downward

FIG. 6. RCA Telemural Projector, type TLS-50/51 with three side-by-side Schmidt optical systems.

to reflect on the mirror. Held by a deflection yoke, it is surrounded by a correction plate made of plastic. Rays passing through the plate strike a plane mirror, which deflects the rays outward. The barrel-type projector used in theatre presentations utilizes a direct projection, eliminating use of the plane mirror. Focus is obtained by moving the cathode-ray tube closer or farther away from the mirror; the closer the distance, the larger the picture. A tilt adjustment provides for throwing angle.

One of the newest products employing the Schmidt system is the recently developed RCA color TV projector, which has three of the optical systems side by side. (See Fig. 6.) This projector was described in more detail in the Telecasts department of IP, May, 1957. Considering the effectiveness of the Schmidt system, this projector is warranted to show color TV with good definition on screens up to 4½ x 6 feet, at a maximum throw distance of 17 feet.

The Schmidt system has long been an aid to astronomical photography; with the rapid strides being made in TV projection, it would be a reasonable assumption that it will be an even more effective aid to that phase of projection which is comparatively new.

## National Carbon Realigns Industrial Sales

In order to provide better technical service to industrial customers, National Carbon Company has initiated a program to reorganize its carbon products sale department.

J. R. Johnstone, carbon products marketing manager, outlined reasons for realignment: "The increasing complexity of the industrial uses of carbon and graphite demands even greater skills in the proper application of these products. By assigning our industrial salesmen specific responsibilities for a limited number of products, they will be even better able to provide customers with the technical assistance they require in selecting the right products for their particular application."

The new program calls for field salesmen specializing in one of the three product groups that comprise the carbon products marketing organization: industrial carbon; brush railroad, and spectroscopic products; and arc carbons.

As differentiated, industrial carbon includes carbon and graphite products such as nuclear graphite for atomic energy installations, graphite reference forms for aircraft assembly brazing, guided missile components, metallurgical molds, graphite crucibles, machined shapes, and miscellaneous rod and plate stock.

Carbon brushes are employed in motors and generators, rotating electrical equipment in both home appliances and in industrial equipment. The railroad products include carbon brushes for diesel-electric and electric locomotives, and signal cells—primary batteries used in railroad signalling systems. Spectroscopic products include both electrodes and powders of extremely high purity for spectrochemical analysis.

Needless to say that arc carbons comprise projection carbons, and stage and TV studio carbons for high intensity light.

District managers located at key cities throughout the country will report to the sales managers of these three groups. Sales managers, who will be responsible for field selling organizations in their respective areas, are: A. W. Wolff, industrial carbon; W. C. McCosh, brush railroad, and spectroscopic products; and J. W. Cosby, arc carbons.

## McAuley Merges with Strong

Charles A. Hahn, president of J. E. McAuley Mfg. Co., for many years one of the major manufacturers of projection equipment, is retiring. Simultaneous with this announcement is the consolidation of the McAuley firm with Strong Electric Corp. which will place all arc lamp manufacturing facilities of General Precision Equipment Corp. under one direct management.

At present, this will mean that the Strong company, also one of the pioneer manufacturers of theatre equipment, will supply McAuley products, including the well-known Hy-Candescent and Peerless Magnarc projection arc lamps. Replacement parts for these lamps will also be supplied by Strong, although orders for both equipment and replacements will continue to be received at the McAuley plant in Chicago.

Strong Electric will continue in their own line of supplying arc lamps, rectifiers and reflectors, arc lighting equipment for the graphic arts industry, theatre and arena type carbon arc spotlights, carbon arc slide projectors, transformers, and searchlights for the armed forces.

The McAuley Hy-Candescent lamp is a condenser-type high-intensity lamp using 13.6-mm carbons burning at high amperage; the Magnarc is a simplified high-intensity lamp employing non-rotating carbons at lower amperages.

**Wide variations in the provision of title and part number frames, changeover cues, etc., would justify criticism.**

# The Release Print Problem Of Standard Markings

By JOSEPH HOLT
Member, IA Local 428, Stockton, Calif.

CURRENT PRACTICE of the producers leads to wide variation in the character of release prints, and projectionists are justified in continued criticism of these variations. Certainly good projection practice would call for a complete understanding throughout the industry of what should be expected in the matter of title frames, part number designations, foot numbers, changeover cues, and run-out footages.

Very few release prints provide legible title and part number frames. Either the lettering is tiny or the contrast is so small in range as to make it extremely difficult to read. This condition explains why so many projectionists find it necessary to paint on individual part numbers or to attach various types of tapes with the pertinent information.

It need hardly be said that the release print should require no mark of any kind from the projectionist. Dark part numbers increase the chance of improper reel sequence, and illegible titles have in fact contributed to the transposition of a reel of one feature showing up on the screen for the same part number of another feature.

### Standards Suggestion

Industry standards for this particular part of the release print are good, and if adhered to would leave little indeed to cause difficulty. However, the writer would suggest that consideration should be given to the substitution of a standard which would provide for part numbers to be full frame size on alternate frames, while title only would occur on each blank frame remaining.

Contrast should be adequate to assure ready legibility, and color prints made by the imbibition process should not be hopelessly smeared so as to degenerate contrast. The run-in leader itself is usually provided with the proper number of feet preceding the picture footage, but there the adherence to an acceptable standard is at an end. Foot numbers may be on dark backgrounds, and frame lines may be effectively non-existent. What is much more serious, frame lines should invariably be the same width as the projected picture requires.

Reference is to the fault encountered in release prints with narrow frame lines resulting from a .715-inch picture height. Often the leader will be printed with frame lines which provide for .620-inch frame height.

Initial framing accuracy may be affected by this inconsistency, and on fade-out to fade-in changeovers can produce annoying white bars on screen top and bottom.

In discussing the deviations of motor and douser cues, it is only fair to point out that it is rare indeed to encounter an American-made film which does not bear some type of cue placed accurately enough in the position specified by industry standard and custom. The big trouble with most such cues lies in the fact that they occur in areas of extreme density or are accompanied by fast action which mask the presence of the cue dot.

Producers for a long time adhered to the idea of keeping significant sound at least five feet away from reel ends. Perhaps the standard asks too much, but on the other hand every projectionist of any experience at all can call to mind dozens of instances of changeover occurring during dialogue, with little time for operation of the sound changeover device.

### Homemade Cue Marks

But cues have been the subject of more projection room nervousness than other controllable print factors. Many projectionists are so unsure of the cue provided by the producer that circles, punch marks, pencil or ink marks, scratches are placed on all cues regardless of their prominence in the picture.

Some producers have tried to prevent the film damage resulting from this condition of "do-it-yourself" cue marks, and have run foul of a condition almost as bad.

In certain releases, the cues have been surrounded with a huge white circle which loom up on today's larger screens as rather formidable and distracting marks.

The need here is for the reduction in size of the cue itself. In view of the fact that the cue is actually magnified approximately one-third more than the old picture size had established, it is merely common sense to look at the cue itself with the new standards in mind. To the writer's knowledge, only one company has made any effort to bring the cue down to reasonable size.

Studies should be made to determine

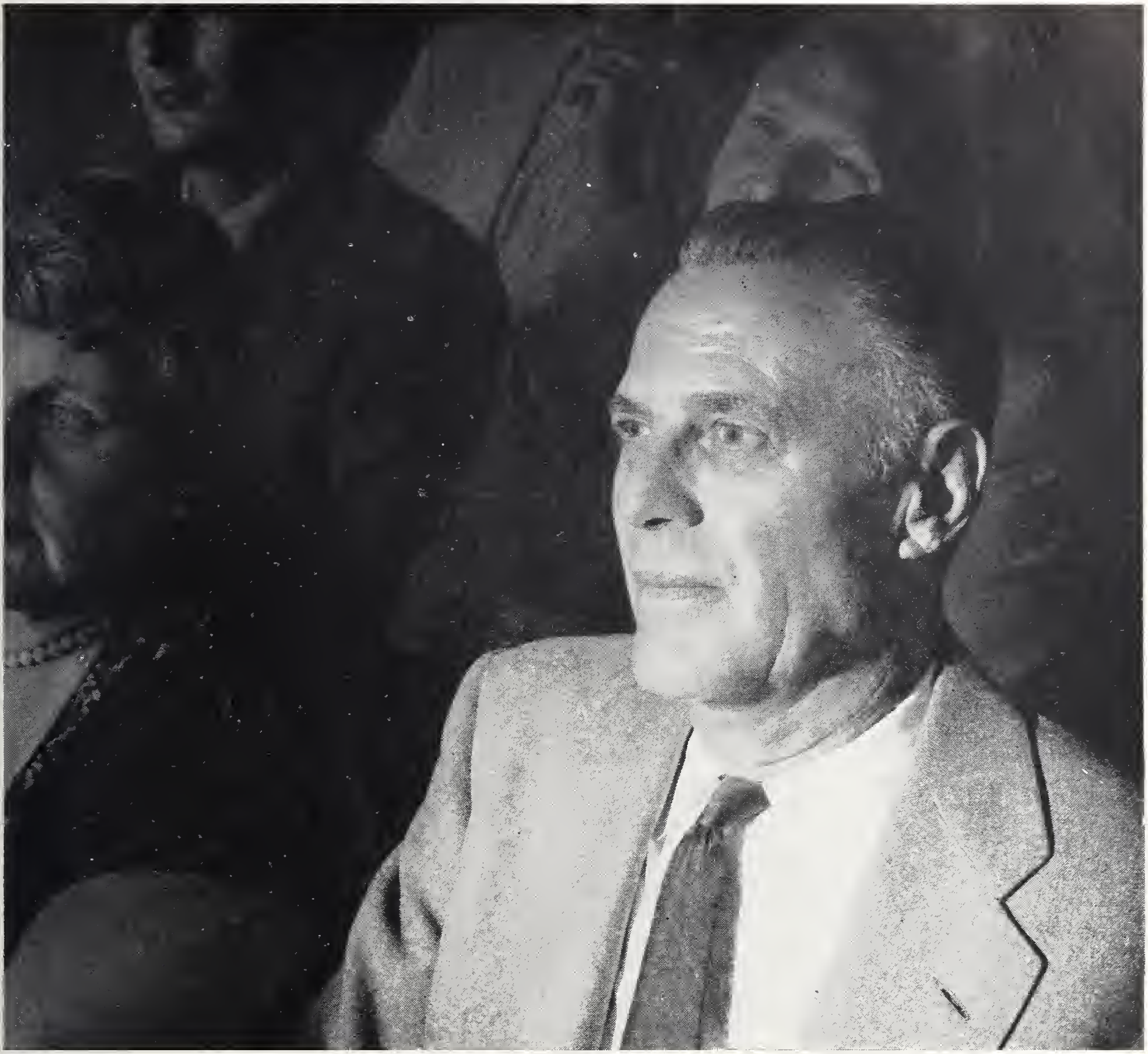
(*Continued on page* 33)

### A Booker Does Not Take Bets

In every specialized field, there are certain terminologies and bits of jargon which tend to throw the uninitiated into pitiful fits of confusion. For example, in this highly-precisioned motion picture industry of ours, a "trailer" is not that long towable house on wheels that the world outside filmdom understands it to be. Nor is an "indie" a member of the earliest group of American citizens that we know.

Now comes the strange story that tells of a worthy booker in our noble trade being outrageously misconstrued as, of all things, a "bookie," and by all people, an income tax investigator. The booker in the case is Dorothie Warneke, currently booking for Columbia in Kansas City; the income tax man has judiciously chosen to remain anonymous.

The confusion didn't last too long, but it was discomforting as long as it did last. "When I explained my work to that income tax man," quoth Dorothie, "he said he thought mine would be classed as a high precision job." High precision it is, as is everything else about the motion picture business, and let's not have any more horsing around.



**Experts will fall out, and here at odds are two such proponents of variable-area and variable-density film tracks.**

# Variable-Area vs. Variable Density

## Variable-Density

By JOHN G. FRAYNE

ENGINEERING MANAGER, WESTREX CORP.

THE CONTROVERSIAL article by Robert A. Mitchell in the June 1957 issue of your valued magazine entitled "Film Standards for Picture and Sound" calls for some comment and corrections of what appear to this writer to be erroneous statements. For example, Mr. Mitchell makes the statement "Even though variable-area optical tracks have long been recognized as more versatile and superior to variable-density . . ." I do not know on what grounds this sweeping statement is based. From the theoretical standpoint, which is well covered in the technical literature, variable-density exhibits considerable superiority over variable-area. In the practical field of sound recording, variable-area suffers in many respects in comparison to the variable-density type of recording.

At this point, I would like to call attention to the erroneous conclusion in Mr. Mitchell's article in which he states that "minute errors in optical-tube azimuth do not produce distortion." Theoretical and experimental consideration shows that when the azimuth error is such as to produce a high-frequency loss, it simultaneously produces distortion in variable area tracks[1].

### "Noise-proofed" VA Tracks

Mr. Mitchell states that variable-area tracks are more readily "noise-proofed." I do not know on what grounds this statement is made. From the theory of noise reduction as applied to both types of tracks, it can be shown that for the same linear movement of the biasing element, the noise reduction expressed in decibels is twice as great for variable-density as for variable-area[2].

The statement that variable-area tracks are not subject to "processing distortions" must appear very unrealistic to laboratory film control engineers who struggle daily with cross-modulation and other types of tests to insure proper density values on both negative and positive tracks. The old myth that variable area is immune from processing deviation in contrast to the recognized necessity for controls on variable-density is no longer given any credence by either sound recording or film processing experts[3].

Mr. Mitchell's comment that really hit was the statement that the Western Electric light valve introduces harmonic distortion especially in the higher frequencies, whereas other variable-density systems were free from this effect. Mr. Mitchell apparently has not kept up with the literature

*(Continued on page 32)*

## Variable-Area

By ROBERT A. MITCHELL

CONTRIBUTING EDITOR, IP

MY STATEMENT that "variable-area optical tracks have long been recognized as more versatile and superior to variable-density" was based upon the following considerations:

(1) Variable-area tracks are unaffected by the small-to-moderate errors in exposure and development which introduce troublesome distortion in variable-density tracks. (2) The dynamic range of v-a tracks is appreciably greater than that of v-d tracks. (3) Bilateral-record equipment is readily converted to the production of "multiform" v-a tracks which practically eliminate the effects of uneven slit illumination and possess the advantages of both v-a and v-d tracks. (4) The shape of the recording vibrator-valve may be modified to counteract electrical and acoustic distortions which can be eliminated only electrically, and with difficulty, in v-d recording. (5) V-a tracks are better adapted to printing on multilayer color stock in which the closest gamma control of the soundtrack is not always economically feasible. (6) V-a recorders of good performance quality can be manufactured at less cost than v-d recorders of comparable characteristics.

The word "minute" in reference to azimuthal errors should be emphasized; but in the passage mentioned by Doctor Frayne the writer is guilty of an inaccuracy no greater than that in the statement: "On the other hand, the only effect of azimuthal error on variable density is attenuation of output at the high frequencies." This erroneous statement occurs in Doctor Frayne's earlier article, "A Defense of Magnetic Reproduction" (IP for March 1957, p. 22 *et seq.*).

### Small Azimuthal Error

When azimuthal error is *small enough* to produce (so far as aural perception is concerned) nothing more than high-frequency attenuation with v-d tracks, no audible distortion will be apparent with either type of track. This statement does not hold good for the old single type of v-a track, but it is true for all bilateral and multiform v-a tracks.

It should not be assumed that azimuthal error in a sharply defined scanning beam produces the same effect as a correctly oriented, but out-of-focus, scanning beam. It can be shown that sine-wave curves in *both* v-d and v-a tracks generate more or less of a square-wave component

*(Continued on page 32)*

# Paramount's Telemeter Drive

**Paramount Pictures tees off on an intensive publicity campaign to sell its tollvision system, offering public demonstrations.**

THE SAVOY PLAZA Hotel in New York City was a busy place the last weeks of August. Motion picture executives and exhibitors, representatives from other entertainment fields from the legitimate theatre to sports, TV executives, technicians and engineers, labor groups and talent guilds, financiers, educators, public officials, and of course the press, came by invitation to get a look at International Telemeter Corp.'s closed circuit pay TV system. It was the first Eastern public demonstration, although there have been previous showings in Los Angeles. The demonstration included a slide lecture, stressing salient financial points, a fairly comprehensive explanation of the technical side with an exhibition of the control room, and a demonstration of the coin-box proper, with an accompanying discussion by Paul MacNamara, vice-president of Telemeter—a subsidiary of Paramount Pictures—and Carl Lesserman, originator of the system.

### *The Background of Telemeter*

Most exhibitors attending the demonstrations, although they had read enough about Telemeter in the trade papers the past few months, were still hazy as to details. By the time they left, they had been pretty well briefed on practically all phases.

Initial development of Telemeter began back in 1949. Paramount acquired its first interest in the corporation in 1951, and now holds about 90 per cent of the stock. In 1953, the closed circuit system was tried on an experimental basis in Palm Springs, California, over a wired system with the public as the actual customers. The pictures shown were the same playing in the local Palm Springs theatre, but both releases were booked by the local exhibitor. Interesting to note that initial installations were in homes belonging to the "upper social bracket."

The results of the Palm Springs experiment instigated an accelerated program of research and development for the next four years, while improvements were made and bugs eliminated. The corporation now announces that Telemeter is ready for mass production both for wire—which does not require FCC approval, and for air—which does. At present, the FCC is considering this. Production-wise, Telemeter now operates four plants in West Los Angeles.

The Telemeter is a coin-box-speaker attachment about the size of a small table radio which can be installed in any TV set—color or black-and-white—in a matter of minutes. The attachment does not require making any changes in the TV set. Total cost to the exhibitor, which includes the device, wiring, installation, plus a prorated share of the studio cost, adds up to approximately $100 per home, at no cost to the consumer.

The device has six important parts: the program selector; the barker; the coin mechanism; the price indicator; the credit storage indicator; and the program identifier.

### *How It Works*

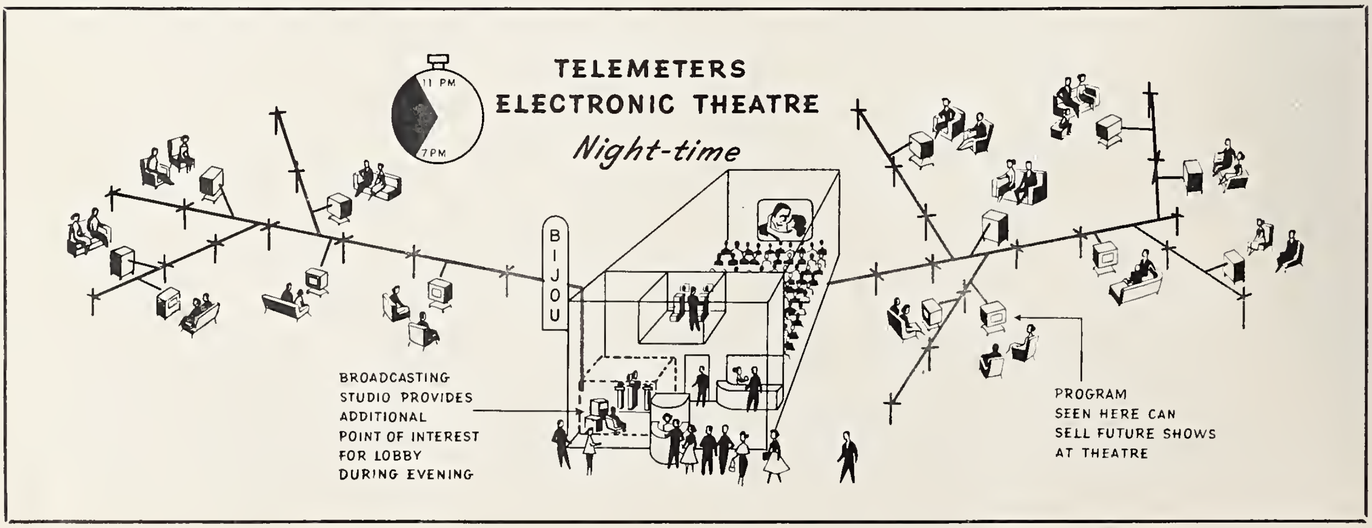
*The program selector* allows selection of three closed circuit channels over an unused broadcast channel which are scrambled until payment is made. In the New York demonstration, unused broadcast channel 6 was used, receiving three Telemeter channels designated 6A, 6B, and 6C. The selector is turned to anyone desired. The free broadcast channels are, of course, still available.

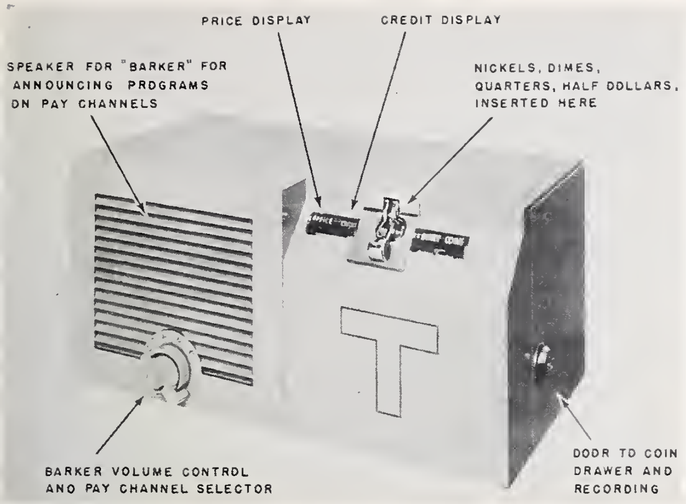
*The barker* is a speaker independent of the regular one in the set which continually provides information concerning Telemeter programs—which channel is showing what, price, starting time, etc.

*The coin mechanism* is the slot-type that will accept nickels, dimes, quarters, and half dollars up to $2.50.

*The price indicator,* once the channel has been selected, will immediately display the price of that particular program. As coins are deposited, the indicator automatically shows the amount of unpaid balance after each coin has been inserted.

*The credit storage indicator* serves two functions. In case of over-payment, it displays the amount of such over-payment which is then mechanically credited to any subsequent program you may buy. It also serves as a bank in which any amount up to $2.50 may






The telemeter box, which includes the informotion "barker," coin box, ond installment record. Its size is obout thot of o small table rodio.

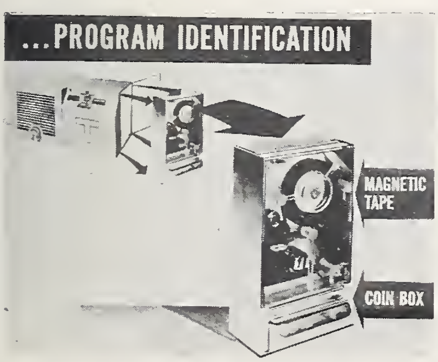
be deposited at any time to be drawn upon in the future for any Telemeter shows.

*The program identifier* is a magnetic tape in the coin box which keeps a complete record of every program that has been bought. The coin box, replaced every 30 to 60 days, is taken to a central auditing office where the information on the tape will give each individual producer an accurate record of the number of sets that purchased his particular show, and will make possible an accurate division of income from each box among the different producers.

### The Studio

The central studio equipment consists essentially of standard TV camera chains, plus special Telemeter equipment designed to send pricing information to subscribers, program-identification signals, and barker information.

As demonstrated in New York by Telemeter technicians Jack Doze and Sam Margolin, with IA Local 306 projectionist Lou Pellitier, the small studio employed Hallamare TV equipment, three Bell & Howell 614 16-mm projectors (although there have been indications that film will go to 35-mm), and three DuMont power racks, one for each Telemeter channel. Included in these racks are special tab-disks that integrate the amount of payment to be made to unscramble the picture. Thus, the Telemeter device may use variable price: for example, 85 cents for a ball game, $1.00 for a special event, etc. (Prices have not been set.) By depressing certain key tabs on the disk, any number of price variations may be sent over the closed circuit.




Interior view of the coin box, showing the magnetic tape installation thot keeps an occurate record of poyment ond program selection.

The Telemeter corporation maintains that the entire studio is not only comparatively inexpensive to construct, but also easy and economical to operate. Also, the closed circuit wire system is completely compatible with the conventional broadcast over the air. If the FCC authorizes broadcast pay TV, the closed circuit system will be integrated into the broadcast facilities.

### Theatre Applications

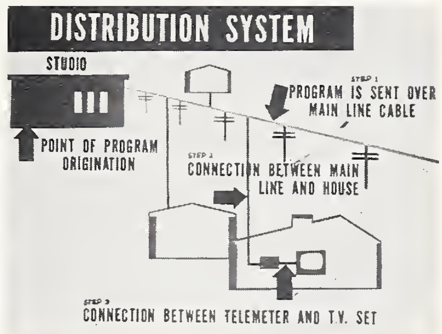
For those exhibitors whose theatres open only in the evening, Telemeter interests reason that an installation of an electronic theatre would mean that income would start at 9:00 in the morning rather than 7:00 at night. An electronic theatre installed in the lobby of such a theatre, it is maintained, would make it possible to be doing business all day. This is dependent on having patrons come in all day watching a telecast originate—newscasts, etc. This could mean extra all-day business at the concession department.

A possible source of income could be selling advertising time on daytime free programming, aimed at local and neighborhood advertisers. And bad weather and like conditions that negate theatre attendance might be surmounted by the prospective customer still paying for a motion picture without leaving his living room.

A modern facet, the large shopping center, has come in for consideration as a spot to originate programming for a neighborhood TV system. Telemeter would intend that a small audience seating section could be installed surrounding the studio layout, where shoppers would be invited to rest for a few moments and watch the system in operation.

National manufacturers would be invited to put on demonstrations of their products—those products aimed at the woman shopper—in the fringe area of the studio, which would be designed to be a central exhibition area for neighborhood and national advertisers.

Both the studio in the neighborhood theatre and in the shopping area would be glass enclosed. This set-up is somewhat similar to the RCA Exhibition




The distribution system os plonned by Telemeter is much the some os other versions of poy-TV; moin vorionce is in the method of poyment.

Hall in Radio City, New York, where the Dave Garroway "Today" show originates in a glass-enclosed studio that affords observation to sidewalk crowds. So far, it has not deterred technicians.

### The Expense Element

An income point to be considered is that one payment to the device would furnish entertainment to an audience as big as a living-room would hold. Telemeter answers this by figuring that building a new motion picture theatre today would cost approximately $400 a seat, as opposed to the $100-per-home tab for Telemeter installation.

The system is to be licensed to franchise holders on a percentage-lease basis. Franchises are available to ex-

(*Continued on page* 34)

**New carbons designed for 95-110 and 110-120 amp give substantial increases in light, efficiency, stability.**

# New HI Rotating Positive Carbons For Motion Picture Projection†


By R. B. DULL, J. G. KEMP, Jr. and E. A. NEEL, Jr.
National Carbon Co., A Division of Union Carbide Corp.


THE UNIVERSAL adoption of wide screens by large indoor theatres and the trend toward larger screens in outdoor theatres have created a need for more light. To meet this demand, two new carbons for reflector lamps of the rotating positive-carbon type have been developed, one a 10-mm X 20-inch and the other an 11-mm X 20-inch High Intensity Projector Positive carbon.

## NEW 10-mm CARBON

In an effort to obtain the maximum possible light from the old 10-mm High Intensity Projector carbon it was often burned at 105 amp, or 5 amp above its recommended maximum current. The new carbon has a maximum recommended current of 110 amp, i.e., 10 amp higher than that of the carbon it has replaced. At 105 and 110 amp,

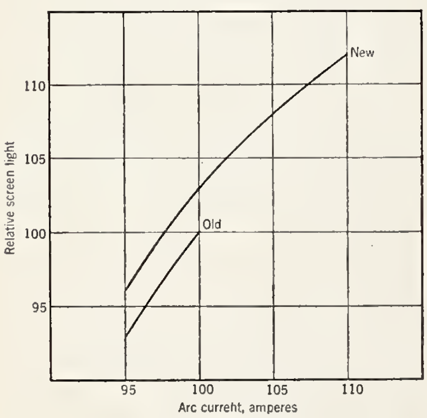



FIG. 1. 10-mm High Intensity Projector carbon — relative screen light vs. arc current, at maximum screen light.

in a projection lamp adjusted to give maximum light at the center of the screen, the new and improved carbon produces approximately 8 per cent and

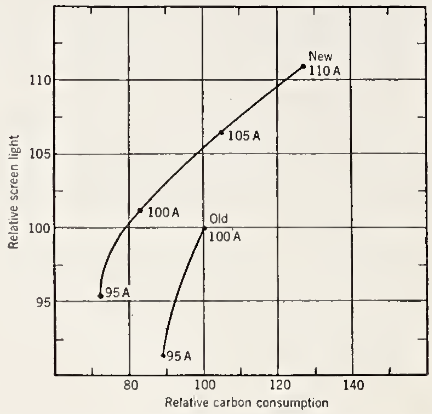



FIG. 2. 10-mm High Intensity Projector carbon — relative screen light vs. relative carbon consumption.

12 per cent more light, respectively, than the old 10-mm carbon at 100 amp.

Although the recommended maximum current for the improved 10-mm carbon is 10 amp higher, its recommended minimum current of 95 amp remains the same as that of the old 10-mm carbon. At 95 amp in a lamp adjusted for maximum light at the center of the screen, it produces about 3 per cent more light than the old 10-mm carbon at the same current.

Relative maximum screen light as a function of arc current is shown in Fig. 1, where the screen light from the old 10-mm carbon at 100 amp is used as a basis for the comparison.

The results are approximately the same when the projection lamp is adjusted to give 80 per cent side-to-center light distribution on the screen. At 105 and 110 amp, the new 10-mm carbon gives 5 per cent and 10 per cent more light, respectively, than the old carbon at 100 amp.

The efficiency of the new 10-mm carbon is considerably greater than that of the old carbon as illustrated in Fig. 2, where relative maximum screen light is shown as a function of relative carbon consumption with light and consumption of the old carbon at 100 amp taken as the base.

At any current in the 95- to 100-amp range, the new carbon burns approximately 15 per cent slower than the old one, at a corresponding current, while producing slightly more light regardless of whether the projection lamp is adjusted for maximum screen light or for 80 per cent side-to-center light distribution. At a given light level the increase in efficiency is even greater than at a given current. In the 95- to 100-amp range, at corresponding light levels, the new carbon burns 20 per cent to 25 per cent slower.

In addition to the advantages described above, the crater of the improved carbon is deeper, larger in diameter and remains straighter than that of the older 10-mm High Intensity Projector carbons. These features contribute to a steadier and more uniform screen light.

## NEW 11-mm CARBON

The improved 11-mm High Intensity Projector carbon is particularly suited for drive-in theatres, especially those having very large screens. The

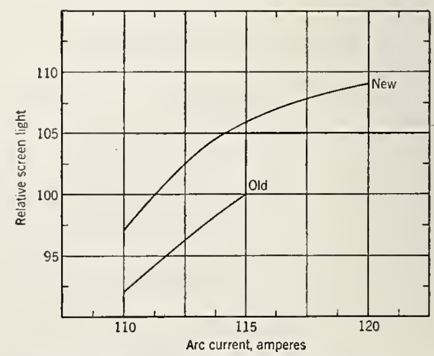



FIG. 3. 11-mm High Intensity Projector carbon —relative screen light vs. arc current, at maximum screen light.

†Journ. SMPTE, May 1957

| Carbon | Amps | Volt | 80% Distribution Screen Lumens | 80% Distribution % Dist. | Maximum Light Screen Lumens | Maximum Light % Dist. | Approx. Carbon Consumption Rate, in./hr. |
|---|---|---|---|---|---|---|---|
| 10-mm X 20-in. new H. I. Projector | 95 | 51-57 | 22.200 | 80 | 27,100 | 60 | 15.0 |
| 10-mm X 20-in. new H. I. Projector | 100 | 54-59 | 23,800 | 80 | 29,100 | 60 | 16.5 |
| 10-mm X 20-in. new H. I. Projector | 105 | 56-61 | 25,000 | 80 | 30,500 | 60 | 21.5 |
| 10-mm X 20-in. new H. I. Projector | 110 | 59-65 | 25,900 | 80 | 31,600 | 60 | 24.5 |
| 11-mm X 20-in. new H. I. Projector | 110 | 57-62 | 25.200 | 80 | 31,200 | 60 | 12.5 |
| 11-mm X 20-in. new H. I. Projector | 115 | 58-64 | 26.600 | 80 | 33.200 | 60 | 16.0 |
| 11-mm X 20-in. new H. I. Projector | 120 | 59-68 | 28.000 | 80 | 34.700 | 60 | 20.5 |

**TABLE I. Screen Illumination With New 10-mm Hi Projector Carbons in f/1.7 Motion-Picture Projection Systems—0.715-in. X 0.839-in. CinemaScope Aperture for Optical Sound.**

old 11-mm carbon had a recommended current range of 110 to 115 amp, but like the old 10-mm High Intensity Projector carbon, it was often burned above its recommended maximum current in order to obtain the maximum possible light, in spite of the fact that some unsteadiness was encountered. The improved 11-mm carbon has a recommended current range of 110 to 120 amp, or 5 amp higher than the carbon it has replaced.

A comparison of relative light for the old and new carbons, as a function of current, when the projection lamp is adjusted to produce maximum light at the center of the screen, is shown in Fig. 3.

The light output of the old 11-mm carbon at 115 amp has been selected as the basis for the comparison. At 115 and 120 amp. the improved carbon produces approximately 5 per cent and 10 per cent more light, respectively, than the old 11-mm carbon at 115 amp. This also holds true when the projection lamp is adjusted for 80 per cent side-to-center light distribution. Figure 3 shows that identical light levels can be obtained by reducing the current for the improved carbon by 3 to 4 amp.

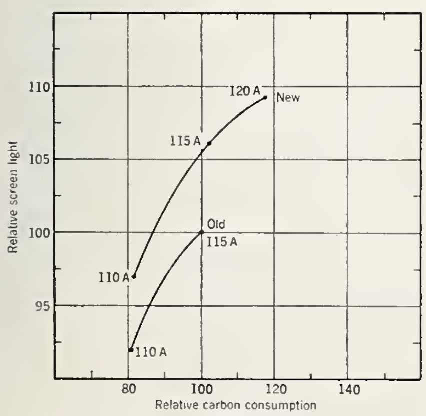



**FIG. 4. 11-mm High Intensity Projector carbon—relative screen light vs. relative carbon consumption.**

As in the case of the improved 10-mm carbon, the new 11-mm carbon is more efficient than the old one. At comparable light levels the new carbon burns 10 per cent to 15 per cent slower than the old one, as illustrated in Fig. 4.

A larger and deeper crater combined with an ability to hold a straighter crater are features of the improved 11-mm carbon contributing to a more uniform and steadier light on the screen.

## SUMMARY OF PERFORMANCE

The development of new 10-mm and 11-mm High Intensity Projector carbons has contributed to the advancement of wide-screen motion-picture projection by (1) making more light available through the extension of the upper limits of their current ranges, and (2) producing a steadier and more uniform screen light through a deeper and wider crater, and a crater which has less tendency to become crooked during the projection of a film. The latter feature means that less attention need be given to the carbons to insure optimum projection conditions.

## SCREEN ILLUMINATION AND CARBON-CONSUMPTION RATES

In 1953, the 16½-in. diameter, $f/1.9$ lamp reflector, $f/2.0$ and $f/1.9$ projection lenses, and standard 0.600-inch X 0.825-inch aperture were widely used. Since 1953, 18-inch diameter, $f/1.7$ reflectors and $f/1.7$ projection lenses have become available, and the use of larger apertures has become almost universal.

Table I gives the screen light in lumens, distribution of light on the screen, and carbon consumption at various operating conditions, for the new 10-mm and 11-mm carbons, when used in a typical projection lamp having an $f/1.7$ optical system, and when the light is projected through a CinemaScope aperture for optical sound (0.715 inch X 0.839 inch), onto the motion-picture screen by means of a 4.0-inch E.F. $f/1.7$ projection lens.

The screen lumen figures are for systems with no shutter, film or filters of any kind. Since arc voltage is a function of lamp design, as well as a number of other factors, a range of arc voltages has been given for each current, rather than a single voltage.

Although the improved 10-mm and 11-mm High Intensity Projector carbons are capable of producing as much light as the old carbons at a lower current and consumption rate, it is recommended that they be used at their maximum rated current in order to take full advantage of the increase in light which is so badly needed on the large screens.

### Cameramen and D-I Owners Meet

William Kelley, head of the Motion Picture Research Council, moderated a recent meeting of the American Society of Cinematographers and drive-in owners convened for the purpose of eliminating major problems in outdoor projection. Initial steps were taken to obtain more satisfactory release prints, and the reduction or elimination of low-key scenes. The discussions also included suggestions for relieving the present unfortunate print problem.

# 16-mm PROJECTIONS

AUDIO-VISUAL is a conservative term for an exciting enterprise. One and one half billion dollars (even in these days) is an amount easily read, but not readily comprehended. But the impact that 16-mm has made on the educational, industrial, and allied fields, and the fact that one and one half billion dollars has been spent for audio-visual equipment since World War II—excluding mention that the annual expenditure is now exceeding 180 million dollars—must give anyone connected with the motion picture industry considerable pause. It is to be noted that professional projectionists are now employed in every branch of the 16-mm field: TV, all phases of non-theatrical showings, and personal ventures. It is indicative that many more will be needed. Consider the scope: in the United States alone industry owns and operates more than 150,000 16-mm sound motion picture projectors—representing an investment of 156 million dollars. And that, according to John Flory, Eastman Kodak advisor on non-theatrical films, is a conservative estimate. Taking into account the enormous expenditures in the main routes of the audio-visual area, Flory points out that: "nobody on earth knows exactly how many films a year are being turned out for the theatres, for television programs, as kinescope recordings, for propaganda, for information, for education, for documentation, for instrumentation, for medicine, and for a host of other scientific, industrial, and cultural purposes. There are comparatively few accurate statistics about many of the new and more dynamic aspects of the use of film." It is with this in mind that IP turns, for the moment, from the world of professional theatre 35-mm for a look-see at what unostentatiously has become a major industry. The 16-mm field is not strange country to the theatre projectionist: he knows what the present situation is. Perhaps, from time to time, we can show him what the future will be.

## 16-mm Operations to Get Added Boost

THE RECENT convention of the National Audio-Visual Association in Chicago put an emphasis on providing a national and local-level public relations program designed to "aid the "audio-visual communications industry to achieve its real potential in American life." Various PR experts in the industry outlined efficient public relations techniques to dealers and suppliers, emphasizing the need for a strong "grass roots" campaign to acquaint the public with the importance and scope of audio-visual methods of training.

The Association adopted a "Resolution on Public Policy," citing these points: there is a crisis in education, overcrowded schools, a teacher shortage, expanding curriculum; educational research and experience has proven that audio-visual use has resulted in greater, deeper, and faster learning "saving at least one hour per day learning time"; endorsement for AV has come from leaders in the fields of education, religious, government, industry, labor, and community affairs. The resolution stressed greater use be made of AV techniques in church, school, and industry, informing and training personnel in these fields through advertising, leadership, and use of equipment and materials.

In line with this policy two conferences were held at the convention by the U.S. Office of Education under the direction of Dr. Seerly Reid, Visual Education Service chief.

### State AV Survey

A report on the first state-level survey since 1922 by the Office of Education revealed that 46 states reported 1956-57 expenditures by their departments of $1,100,000, and 96 per cent provide audio-visual services to local schools through general and special supervisors, also making fiscal grants to local school districts which may be used for the purchase and use of audio-visual materials.

There are now plans for a large-city-level survey underway, to be conducted in school systems in cities of 200,000 or more population. Problems to be studied will include design of classrooms for the use of instructional materials, including light and acoustical control; equipment formulas in relation to pupil enrollments; and the use of AV materials in both large group instruction and individual and small group instruction.

Closed-circuit TV, which has been quite an object of study for professional entertainment circles, was also given close consideration by the various AV dealers at the convention. Educational circles have long been evaluating the systems as a teaching means, but so far there are a good number of questions to be answered before closed-circuit will be given the educators' complete approval.

One salient fact that the recent NAVA convention revealed was that equipment other than film and projectors is now being provided in greater numbers than ever before. For example, there was a definite increase in the manufacturers of screens, two firms coming forth with flat instead of beaded surfaces. The convention featured the world's largest exhibition of projection, sound, and associated audio-visual equipment.

The convene also marked the installation of the new NAVA president, William Birchfield of Montgomery, Alabama. He succeeds Ainslie Davis of Denver, Colorado, who becomes chairman of the board of directors.

### SMPTE Participates

The Society of Motion Picture and Television Engineers took part in the convention, the first time in recent years. They featured a special display, highlighting the special services of the Society that would be of interest to audio-visual specialists: the four classes of membership offered; development of standards for film and equipment; test films planned by technical committees of the Society for measuring equipment

performance; the dissemination of technical knowledge by publication of a monthly journal and reprints of journal papers of highly specialized interest and importance; and the two national conventions held each year bringing members up to date on new processes and equipment. There are many audio-visual specialists in the SMPTE ranks.

A feature of the exhibit was a demonstration of the designing, planning, and usefulness of 16-mm test films in motion picture and TV fields. This included information on the 16-mm Sound Service Test Film, a special type of print for both picture and sound developed for users of projectors, films, TV stations, and projector service shops. Available also were facts about the short, inexpensive 16-mm test film, "Jiffy," developed in cooperation with the U.S. Navy, as a rapid checker and demonstrator of projector system of performance. Data was supplied on the 16-mm Registration Test Film, developed to provide in a single test film of high accuracy several quantitative visual tests that have always been difficult to perform.

## Kodak's New Projector

EASTMAN KODAK has announced an improved model of their top 16-mm projector that is said to offer 20 per cent more illumination, and which may be adapted for magnetic as well as optical sound. The new Model 25B is warranted to provide so much greater shutter-light transmission than the previous model that it now makes professional theatre-quality brightness possible on screens 25 to 35 feet wide.

The newly-developed Eastman Optical-Magnetic Pre-amplifier, which will accommodate the signal output of a magnetic soundhead as well as the standard optical systems, is included as standard equipment. Field installation of another new device, the Eastman Magnetic Sound Playback Kit provides for reproduction of magnetic sound. It is installed in an adjustable mount on the projector, converting the Model 25B for interchangeable or simultaneously mixed handling of either magnetic or optical tracks.

The new Eastman Kodak 16-mm projector, Model 25B, operated for a special CinemaScope program at the recent NAVA convention in Chicago. This heavy-duty 16-mm Eastman projector gives a light increase of 20 per cent and may be adapted for magnetic as well as optical sound reproduction.

The Altec-Lansing main amplifier power output has been increased from 15 to 30 watts, stated to yield a substantial reduction in harmonic distortion.

Illumination may be supplied by either tungsten or arc lamp. Minimum illumination for the tungsten version is 550 lumens; the arc model has a minimum illumination of 3000 lumens for color film (without heat glass), and 2400 lumens for black-and-white (with heat glass).

Previous features of Eastman 16-mm projectors are retained, such as: Kodak Projection Ektar Lens, 46 ampere Strong arc lamp, microphone or photograph input, and Altec-Lansing "Voice of the Theatre" Speaker.

Field conversion of the previous Model 25 projector may also be made by obtaining the Eastman Optical Magnetic Pre-amplifier and Magnetic Sound Playback Kit. Prices and additional information may be obtained from audio-visual dealers.

## New Westinghouse Lamps

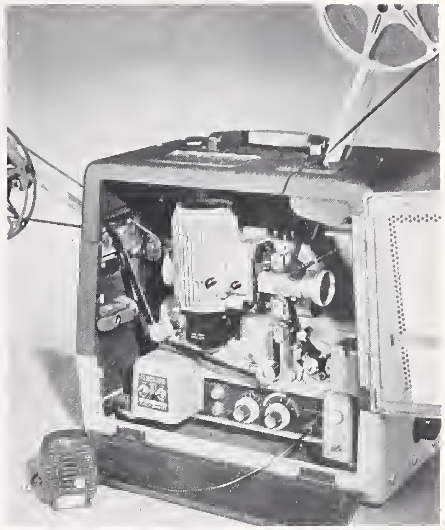
ONE OF the features at the recent NAVA convention in Chicago was the Westinghouse exhibit of their new products, with the emphasis on projection lamps.

Featured was the xenon short arc projection lamp which promises to be comparable to the carbon arc for 16-mm projectors. The company warrants that the daylight quality of the lamp is most adaptable to color photography.

Exhibited also was the new "Focus-Lok" projection lamp which has as its main feature the precise locked-in prefocused alignment constructed on a new base with a unique socket construction. Readers of IP may find a more detailed description on page 21 of our April issue this year.

A Westinghouse innovation is their recently developed 1200-watt projection lamp which is interchangeable in most projectors with present 1000-watt lamps. The T-12 design is claimed to produce anywhere from 25 to 30 per cent more screen lumens, due to improved optical fill and increased efficiency.

A full line of the popular Blue Top projection lamps with the floating bridge filament construction was also on display.



New Bell & Howell Filmosound 302 magnetic-recording 16-mm sound projector has 15-watt amplifier, dual recording-level indicator lamps, and separate tone controls for treble and bass. Projector is typical of large strides being made in today's 16-mm manufacture.

## 4-in-1 Projector

PROJECTION OPTICS CO. of Rochester has developed a jack-of-all-trades projector in their new "Transpaque II," which uses a single projection head and lens for opaque, transparency, table, and rear projection.

This unit is capable of projecting 10 by 11-inch transparencies, or 11 by 11-inch opaques, can be moved and set directly on large objects, maps, drawing boards, display cases, and any 11 by 11-inch portion therefrom can be projected.

There is a complete selection of lenses in focal lengths from 4 to 40 inches, which is claimed to afford the right size image for any screen at any comparable distance.

The projector may be purchased for opaque, transparency, table, or for rear projection only. Components for any of the other applications may be added as needed.

### 16-mm Magnetic Film

A new method for producing 16-mm educational sound films in remote parts of the world, where facilities for developing optical soundtracks do not exist, has been revealed by UNESCO. It consists of covering the photographic soundtrack area with a stripe of magnetic material, and recording magnetically. This gives better quality, it is said; unsatisfactory recordings can be erased and new ones made; a commentary in one language can be replaced by one in a different language, and lipsynchronization can be improved. Inexpensive educational sound films can thus be produced on the spot where they are most urgently needed.

**A complaint about print importations and a description of a projectionist-apprentice school are our overseas topics.**

# From the British Viewpoint

## By R. HOWARD CRICKS

WHEN BRITISH films are shown in your country, there is often some criticism on the score of print quality. We over here have always had the same complaint with a certain proportion of American films, and during recent months the Leeds branch of the Cinematograph Exhibitors' Association has become vocal on the subject. From Louis Mannix, a prominent member, I recently received a letter on the subject, which I passed on to the president of the British Kinematograph Society, who promises some action.

I discussed the matter with the manager of a leading laboratory which prints a number of American films. First, he explained, he never receives a dupe negative, but a positive; the reason is that the rate of customs duty on a negative is five times that on a positive—*any* positive—a totally illogical position, due no doubt to the fact that the customs cannot differentiate between a release print and a master.

This would not be so bad if the copy were made direct from the original negative; but in my friend's opinion, more often this print is made from the dupe negative, so that it is a third-generation print, and the copy which the English exhibitor receives is a fifth-generation print. In addition, there is rarely any information provided on such matters as special treatment needed for individual scenes, or a gamma strip which would be a guide to the processing of the dupe negative.

### *Who's to Blame?*

It seems to me that the complaint rests squarely upon the shoulders of certain American producers, who if they knew the rude remarks made about their product, would surely take steps in the matter, such as providing our laboratories with a first-generation master. In the 16-mm field of course, the problem is often solved by the use of the reversal process, which, besides cutting out one printing operation for each positive stage, gives a cleaner print. Possibly reversal processing might be useful in the 35-mm field.

I wonder if some similar difficulty is the cause of complaints in your country on the quality of British films?

### A CINEMA IN PACKING-CASES

A few months ago I mentioned the name of Tom Harkness, manufacturer of the Perlux screen, which in the States is marketed as the "Uniglow." At his Elstree factory I recently saw a complete cinema structure loaded on to a truck for shipment abroad.

This, his latest achievement, was a 750-seater which can be shipped for erection in a few days. The skeleton of the building is of welded steel tube; only 1½ inches in diameter, it is sufficiently sturdy for the erectors to clamber about it to fix the covering. The height to the ridge is 22 feet, and to the eaves 13½ feet.

The covering consists of opaque plastic, .02 inches in thickness; it overlaps at the eaves in order to provide ventilation without admitting daylight. The bottom edge is strained by powerful springs, keeping the material taut over the ribs, and allowing for shrinkage and expansion. The building can, if desired, be fitted with a sunshine roof: by means of winches, sections of the roof can be drawn back.

At one end of the covering is a transparent panel, through which the projectors shoot, the projection room being built outside the main structure. An entrance vestibule is built on to the cover. A number of such theatres have been supplied to the Army Kinematograph Corporation, to which an important feature is that when a unit moves, the cinema can move with it. The largest to date, measuring 120 ft. x 40 ft., has recently been installed in Gibraltar.

### TRAINING PROJECTIONISTS

Throughout the history of the cinema, the projectionist has had to pick up the rudiments of his job simply by doing it. Rarely has any provision been made for training him, even though today he may be in technical charge of equipment worth many thousands of dollars, and responsible for the entertainment of vast audiences.

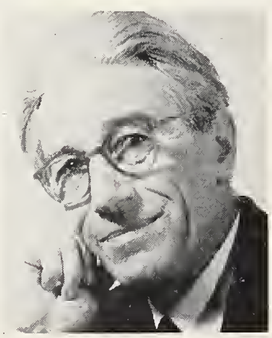
Nearly fifty years ago, our trade union, today known as the National Association of Theatrical and Kine. Employees, actually inaugurated training classes, and I have seen the diploma that was awarded. At various times other schemes have been proposed; our two major circuits run efficient training schemes. During the war I was in charge of the training of projectionists for the Army; in six weeks of intensive training we were supposed to equip a man to undertake the duties of a second projectionist in either 35-mm or 16-mm.

However, apprenticeship has always been the foundation of British craftsmanship. Since the war, the Cinematograph Exhibitors' Association and the NATKE have jointly initiated a national apprenticeship scheme, which

(*Continued on page* 31)

### CRAFTSMEN ABROAD

**Dr. Leslie Knopp, one of the group who formed the present program in England to recruit and train projectionist apprentices, is a former president of the British Kinematograph Society. With a**



**Dr. Leslie Knopp**

**background of naval engineering and many degrees, he is at present technical consultant to the Cinematograph Exhibitors' Association, providing technical advice on any subject to exhibitors.**

**Serving many government departments, Dr. Knopp was instrumental in drafting the present theatre safety regulations in England.**

# Television and Motion Pictures†

By ALLAN LYTEL

**Continuing this series, the author discusses certain problems that are still plaguing the TV industry in the matter of translating motion pictures to a tube.**

### PART II

THE PROBLEM of projection television has been approached from many angles. Two successful projection tubes have held out considerable promise. One is a bent-neck tube. An electron gun is mounted in its neck. so arranged that this gun will sweep a cell which acts as the tube screen. The cell contains many very fine flakes of graphite suspended in a liquid medium and is made of transparent material to allow passage of light. With no potential applied to this cell, the individual graphite flakes will have a random motion which obscures all of the light, hence there is no picture projected upon the screen by the lens. When a potential is applied across this cell the graphite flakes will line up so they are at right angles to its face.

### *Graphite Flakes Motion*

Since the individual particles are thin flakes, light will pass whenever they are at right angles to the face of the cell. Where a slight difference in potential exists between the two faces of the cell at any one point, some of the graphite flakes will be at right angles to the face of the cell but others will be in random motion. Thus this point of slight potential will correspond to gray on the viewing screen. When the individual flakes of graphite have no applied potential, they move about in the liquid and no light can pass through the cell.

The electron beam is so arranged that it sweeps across the tube screen, which is one of the faces of the graphite cell. This cell itself must be made of a material which is not only transparent but also insulating. A transparent cell is needed in order that light may pass through; the insulating property is important in order that the various points of the cell at different potentials may not affect one another by leakage.

In fundamental optical principle, though certainly not electrically, this tube resembles the Skiatron in that the electron beam controls the passage of light. Where the Skiatron gave a dark trace image, this tube gives a light trace image. That is. this tube will allow light to pass wherever the electron beam causes a difference in potential between the cell faces.

### *Relay Projection*

The same general principle of on outside light source projected through a television tube has been used in yet another type of development. A bent neck cathode ray tube has a crystal plate mountedinside the tube. This plate has a transparent conducting coating on its rear face and a fine mesh metal screen mounted in front. Light is passed through this tube screen from an outside source, after which it is collected by a projector lens and thrown upon a viewing screen. The crystal is a material like zincblende, an insulator that can develop points of varying potential on its surface due to secondary emmission. This secondary emission is caused by the electrons coming from the gun mounted in the neck of the tube.

As electrons from the gun arrive at the crystal, they cause secondary emission because of their high speed. The secondary electrons pass to the fine mesh screen, leaving the crystal with points having differences in potential. The number of electrons knocked from the crystal screen depends upon the video information which varies the intensity of the electron base. Thus the crystal plate has a fluctuating difference in potential between its front face an drear coating, and there are many individual spots on the screen that have different potentials with respect to the rear coating. This condition may be compared to that on the Iconoscope mosaic, which produces a similar effect although through an entirely different mechanism. This crystal screen produces no visible picture image whatsoever.

### *Polarizing Action*

When two polarizing plates, A and B, are so mounted that their axes are at right angles no light passes through such a system. Light may go from the original source through screen A and through the crystal plate, but this light is stopped by polaroid screen B.

However, a potential difference between the front and back surfaces of the crystal screen has a remarkable effect on the light. If light traveling from screen A to screen B passes through a charged area of the crystal screen its polarization will be so rotated that some light can pass through polaroid screen B. Thus when this screen has no potential difference applied at all—that is, when there is no video information supplied and no electron beam is present—no light will be passed through to the projection

(*Continued on page* 30)

†Condensed by permission from Chapter 6 of Mr. Lytel's book: "TV Picture Projection and Enlargement," John F. Rider Publisher, Inc.

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### Oscar F. Neu Dies

Oscar F. Neu. owner and president of Neumade Products Corp., manufacturers of equipment for motion pictures, radio and TV, died at his home in Crestwood. N. Y. on August 26. He was 71.

Neu had always been active in motion picture industry affairs. He was cofounder of Theatre Equipment and Supply Manufacturers Association, and served as its president from 1946 to 1951. In 1955 he was elected President Emeritus. the only member of that organization to be so honored.

In a long and varied career in the theatre, motion picture, and TV industries, Neu was at times a merchandiser, a vaudeville performer, a screen actor and director, a broker of motion-picture by-products, and finally a manufacturer and distributor.

He was a member of the Motion Picture Pioneers and Variety Clubs International, a fellow and governor of SMPTE, and a 32nd degree Mason.

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The function of this department is to provide a forum for the exchange of news and views relative to individual and group activities by members of the organized projectionist craft and its affiliates. Contributions relative to technical and social phases of craft activity are invited.

# *In The* SPOTLIGHT

RESOURCEFULNESS

*Ed McCarmack, IA Local 582, Brantford, Ont.*

"—and it is upon this jovial note that we bid farewell to El-Salvador."

THE TELEMETER story in this issue (see page 12) raises, once again, that old question: What About Us? Discerning readers will note in that account—conspicuous by its absence—no detailed information concerning the role of the projectionist in this latest lifebuoy for a harassed industry. The reason is that, frankly, we do not have any information as yet. That one or more projectionists will be used in the new systems, we have no doubt. An IA man was on hand at the recent New York demonstration.

But what effect tollvision will have on the projectionist craft eventually—drought or the horn of plenty—has given us pause for thought. We would suggest that those members in the craft who are in the immediate neighborhood of pay-as-you-see give it some thought also.

• The New York State Association of Motion Picture Projectionists will hold its 1957 Fall meeting on Monday, October 21, at Ed Martin's Restaurant in Liverpool, N. Y. (Liverpool is four miles north of Syracuse.) The meeting is scheduled to open at 2 o'clock in the afternoon and Bill Ingram, chairman of the Educational Committee, promises a program of timely interest. Syracuse Local 376 will be host at a buffet luncheon at 6 p. m., which will be followed by a gala midnight banquet, plus entertainment and dancing.

• Strong Electric Corp. recently contributed a pair of Strong low-intensity arclamps to the Dallas (Texas) Scottish Rite Hospital for Crippled Children. The company also sent one of its factory representatives to supervise the installation.

• District No. 2 Council convened in San Diego, Calif., August 20, holding one of its four annual meetings. The Council comprises 24 IA Locals in Southern California, Arizona, and Nevada.

**Social Security Benefits**

**Recent changes in the Social Security Law give more benefits to a greater number of people. The Law now provides:**

**1. Monthly old-age pensions for men over 65 years of age, and for women over 62 years of age, and for their dependents.**

**2. Monthly disability insurance after 50 years of age.**

**3. Benefits to survivors of deceased workers.**

**No old-age, disability, or other type of benefit is paid by the government unless application is made at the nearest Social Security office. The address can be found either in the telephone directory under "U. S. Government, Department of Health, Education, and Welfare" or at your local Post Office.**

**Important: apply promptly or you may lose benefits.**

• William Marvin Sweeney, member of the 25-30 Club of New York, was recently the recipient of a service pin marking 40 years membership in the BPO Elks Lodge. Sweeney, who now makes his home in Austin, Texas, has a withdrawal card from New York Locals 1 and 306. He holds a life membership in Keystone Lodge 235, F&AM of New York after 35 years, and is also a member of the T. Neal Porter Masonic Lodge in Austin, serving as its chaplain.

• Toronto Projectionists' Recreation Club of Local 173 closed its 1957 bowling season with a dinner-dance attended by 80 members and their wives. Among the highlight of the evening's festivities was the presentation of awards to the season's prize winning team.

• A difference of opinion between the management of the Strand Theatre in Middletown, Ohio, and the officials of Local 282 as to what constitutes a road showing of a film was the reason for the recent cancellation of the scheduled presentation of "The Ten Commandments." F. L. Francis, business representative for Local 282, contended that since the admission price for this showing was in-

TORONTO LOCAL 173 TROPHY-WINNING BOWLING TEAM

Members of the Toronto Projectionists' Recreation Club of Local 173 prize-winning bowling team for the 1957 season are shown here with their awards. Left to right: Harry Jomain; Lou Lodge; Andrew Pura, captain of the team, holding the Local 173 Trophy; Charlie Hollett, and Bert Measures. The other member of the team, Charlie White, was absent when this photo was taken.

# News and Views from District No. 2

**By HANK BOLDIZSAR**

Member, IA Local 150, Los Angeles, Calif.

SOUTHERN California has long been regarded a mecca for those contemplating retirement from gainful employment and this part of the country has, therefore, gained immeasurably by rolling out the welcome mat to all who seek to spend their retirement in the quiet and restful atmosphere of our rural areas and the wonders and beauties of our scenery and climate. (California Chamber of Commerce please note.) This month I shall devote these columns to two "retirees," former New York City Local 306 projectionists, who pulled up roots and moved their homes and families to our part of the country.

In a recent letter from Brother Morris Klapholz, secretary of the 25-30 Club

Bert Salisch

of New York, with whom I have long enjoyed a lively correspondence, I learned of two Club members with withdrawal cards from Local 306 who have settled in California—Bert Salisch and Dave Narcey. He wrote in such glowing terms about these two gentlemen that I made it a point to make their acquaintance, and without too much ado I made my first call on Bert Salisch.

I was quite surprised upon meeting Bert to find a brisk, alert business man very much on the beam, so to speak. Although he retired from the projectionist craft a number of years ago, he is as busy as the proverbial beaver as head of a thriving photostat business he established in Los Angeles. (There is a possibility that he may call it quits at the end of this year and retire from all business activities.)

Bert and his charming wife, Marion, have made Burbank, Calif. their home since 1946. Soon after their arrival there they became actively interested in community affairs and helped organize the Burbank Democratic Club, of which Bert served as president and Marion as a State committeewoman. In 1952 Bert was appointed commissioner of Animal Regulations for his adopted city of Burbank.

Such a record of business and community service can hardly be considered retirement for a man who began his projection career soon after the turn of the century. Bert was one of the organizers of the New York City Spotlight Operators' Union, Auxiliary No. 35, which was formed in 1908. The following year, 1909, the projectionist members of Auxiliary No. 35 affiliated themselves with the newly chartered Motion Picture Projectionists Local No. 306, IATSE.

The next scene of operations was Westchester County, N. Y., where Bert played a leading role in organizing a mixed Local, which consisted of projectionists and stagehands. He served as president and business representative for this group. The two crafts later separated and the projectionists were chartered as Local 650, Westchester County, N. Y.

Although a number of years have passed since Bert took a withdrawal card from Local 306 so that he could devote all of his time to his fast growing photostat business on the West Coast, he has remained close to the craft through his affiliation with the 25-30 Club and his continued interest in the IATSE. His three brothers—Lou, Moe, and Al—and two nephews—Joe Salisch and Jack Vollberg—are members of the Alliance. You might call the Salisch clan an IA family.

A visit with Dave Narcey was next on the agenda. The meeting was arranged and one fine afternoon I drove out to the beautiful city of Inglewood, where Dave and Mrs. Narcey make their home. Dave held me spellbound as he related the many exciting events that took place during the early days of motion pictures, and of his many and varied experiences as a projectionist. I had a grand time browsing through the photos and bulletins in his scrapbook of memories, and I can easily understand why Brothers Klapholz and Salisch regard him so highly.

David Narcey

For about 13 years prior to his retirement in 1953, Dave Narcey was projectionist in the private preview room at Radio City Music Hall in New York City. One of Dave's proudest possessions is the beautiful gold wristwatch which his co-workers at the Music Hall presented to him upon his retirement.

Dave's projection career began back in 1907, and as an old-timer in the business he is familiar with all the processes and gimmicks, from Grandeur film and magnascope screens to today's "eenie-meenie-minee-moe" aperture selection routines. His versatility at the craft soon brought him to the attention of projection equipment manufacturers, and in 1915 he became field representative and trouble shooter for the Precision Machine Co. of New York City, manufacturers of Simplex projectors. He was later promoted to the post of supervisor of sales and service.

In 1920 he became associated with the New York City branch of National Theatre Supply, working in the sales and engineering department until 1925 when he left that organization to take the position of sales manager for the Capitol Motion Picture Supply Co. Two years later he became affiliated with RCA Photophone Co. as projectionist,

*(Continued on page 29)*

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creased to $1.50 the Local was justified in demanding that an extra projectionist be hired. Management declared that boosting the admission price to $1.50 did not make this film a roadshow since seats were not reserved.

• Gordon H. Dyer, president of San Antonio Local 407, recently announced a new three-year pact with the Town Twin Drive-In Theatre, the first contract to be signed between the Local and drive-in theatres in its jurisdiction.

• Congratulations to Mr. and Mrs. Charles H. Travis, Schenectady Local 314, who recently celebrated their 60th wedding anniversary.

• D. R. Barneclo was unanimously re-elected secretary-treasurer of District No. 8, which comprises the states of Michigan, Ohio, Indiana, and Kentucky. He is also chairman and secretary of the Indiana State Association of Theatrical Stage Employes and Projectionists.

• As their contribution to the Will Rogers Memorial hospital fund drive, New York Local 306 members waived all overtime pay for working shows running after midnight due to audience collections. This is in addition to the copper drippings drive inaugurated by Local 306 and many other Locals throughout the Alliance for the benefit of this fund.

# New Liner's Seagoing Theatre Equipped For VistaVision, C'Scope, Stereo

PROJECTION EQUIPMENT constructed to meet the requirements of modern motion picture developments—including stereoscopic projection, high aspect ratio, VistaVision, and CinemaScope—has been installed in the theatre aboard the "Empress of England," Canadian Pacific's newest luxury liner. The "Empress" made her maiden voyage this April from Liverpool to Montreal.

Basic projection equipment consists of two 35-mm Gaumont-Kalee "20" projectors fitted with 5000-foot-reel magazines, and mechanical interlink for stereoscopic projection.

A composite starter and changeover box is provided to allow the projectors to either be coupled for stereoscopic projection, or to be used independently for normal projection. As optical sound only is required, the soundheads are of the Gaumont-Kalee type 83 with the enlarged projected image of the soundtrack. A Gaumont-Kalee "18" amplifier feeds a small theatre-type dual channel assembly with the necessary crossovers and filters.

Light is provided by "Universal" 12 mirror lamps with a high intensity trim adopted at 30 amps, supplied from individual Gaumont-Kalee type 609 rectifiers for each projector.

### *16-mm Also Installed*

Also installed is a single G. B.-Bell & Howell model 609 16-mm projector which takes an arc of standard type burning at the same trim as the 35-mm lamps. The 16-mm equipment is fitted with its own individual rectifier. Since the color grading in 16-mm release prints is adjusted for Tungsten lighting (2750 K) color correction of the arc, lighting is accomplished by using Wratten type 85 filters. Arrangements are made to feed the sound output of the 16-mm equipment to the theatre loudspeaker backstage.

The 16-mm system is used for the showing of educational, industrial, and other similar films.

In addition to the main projection equipment, there are the necessary auxiliaries: regulation projection parts, film storage cabinets, rewinding and splicing gear, storage racks for tools, spare accessories, and carbons.

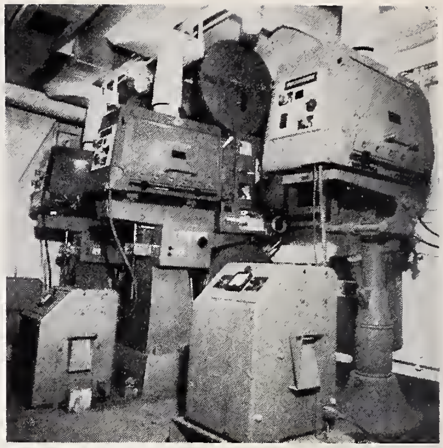
The electric supply available on board the "Empress of England" is three-phase, 230 volts, 50 cycles—star connected without any neutral, so that neither side of any phase is grounded. To ensure that a reasonably balanced phase loading is obtained, one projector is placed on each phase.

### *The Auditorium*

In the theatre proper—in addition to special screen frames with automatic variable screen masking—a motorized curtain control, and a system of stage and screen decorative lighting in color (all controlled from the projection room) was installed, together with the main house dimmers.

The auditorium seats 180, and measures approximately 60 by 20 feet. Lit by cold cathode lighting, it compares favorably with any modern onshore theatre.

Installations by the maritime division of Rank Precision Industries of London also provide for an air-conditioned projection room that is all steel and completely fireproof. A special automatic switch will bring into operation a curtain to protect the audience in case of a projection room fire.

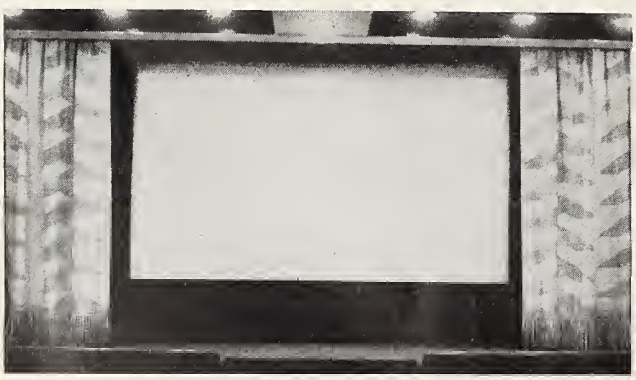


Interior of the seagoing projection room. At the left are the two Gaumont-Kalee 35-mm projectors with "Universal" 12-mirror lamps. Nearest the camera is the 16-mm installation.

At the moment, CinemaScope is not being shown, but all the basic mechanism is ready as soon as the necessary optical equipment is installed.

Projection facilities on commercial transportation has long been noted by IP, and despite the fact that it is an ad-worn phrase, "Half the fun is getting there" would still appear to be accurate. The passengers of the "Empress of England" are treated to first-run product in a first-rate theatre.

A view of the new liner's theatre facing the projection room and (cinematically speaking) portholes.



The "Empress of England" shipboard theatre varidimensional screen. Motor-driven, it can be mechanically opened for wide-screen presentations.

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## Todd-AO In Cincinnati

Lou Wiethe, owner of the new Valley Theatre in Cincinnati, has installed Todd-AO projection and sound equipment for the opening of "Around the World in 80 Days." The Valley is an up-to-the-minute 1,500-seat house with parking for 1,000 cars, located in a large modern shopping center. Width of the new picture is 47 feet on the chord, 50 feet on the curve. Doug Netter, vice-president of Todd-AO, initialed the agreement with Mr. Wiethe, and Todd-AO chief engineer Fred Pfeiff supervised the installation.

## EARNINGS

*(This department is devoted to non-technical items that have a direct bearing on the welfare of the industry.)*

20th-Fox's consolidated earnings in the 26 weeks ended June 29 totaled $4.069,-865—$1.54 per share—nearly double the $2.156.670 for the comparable period last year; income this year was $64.276,-712 compared to $56.779.826 last year. . . . Warner Bros.' nine-month net is $3.174.000, representing a 46 per cent increase over last year's $2,165,000 for a nine months' period; income was $57,-981.000 as compared to $54.225.000 in 1956. . . . Eastman Kodak Co. has a net record earnings after taxes of $40.221.346—$2.08 a share—for the 1957 initial 24 weeks, comparing with $38.753.316 for 24 weeks ending June 10, 1956; consolidated sales amounted to $347.977.709, a 7 per cent increase over 1956's $325.-110,431. . . . Stanley Warner Corp. announces a net profit of $2,699,600, a 33 per cent increase over the $2.029.200 take last year for a comparable 39-week period; income was $83.808.700 against $70,780.400 in 1956. . . . AB-PT's net profit for the first half of this year is $2.700.000—61 cents per common share—a drop from last year's six-month net of $4.202.000—97 cents per share. . . . Consolidated net earnings after taxes of Technicolor, Inc. for the first six months of 1957 amount to $710.000—35 cents a share—comparing with $980.692—49 cents a share—for the corresponding period of 1956. . . . RCA net earnings amount to $20.311.000 for this year's first half, as compared with $20.037.000 for the same period last year; first-half sales of $564.990,000 exceed by 7 per cent the mark set in the first half of 1956.

### Show Biz Improves In Greece and Japan

According to Nathan D. Golden, director of the Motion Picture and Photographic Products Division of the U. S. Department of Commerce, movie business improved last year in Greece and Japan. In Japan, admissions increased to 994,000,000 as against only 885,000,000 the year before. Admissions in Greece totalled 54,500,000 as against 47,400,000 the previous year.

### Experimentals at Brussels

The Brussels International Exhibition next year will feature an international experimental film competition open to all types of production: 16- and 35-mm, silent or sound, color or B-and-W. Grand prize will be 500,000 Belgian francs ($10.000).

# New Look for "80 Days" Equipment

THAT MIKE TODD is definitely going to concentrate on the 35-mm rather than the Todd-AO 70-mm version of "Around the World in Eighty Days" was forcibly demonstrated in Asbury Park, New Jersey last month, at the Walter Reade Paramount Theatre. At this writing, the Todd-AO firm and Michael Todd Productions have been somewhat at odds, Todd-AO feeling that Todd the man should not go around decrying Todd the process, now that Todd the man has embraced 35-mm and feels that Todd-AO projectors and 70-mm prints are no longer necessary.

Mike Todd personally attended the demonstration in Asbury Park, to which over 100 exhibitors were invited, along with other industryites. His purpose was to stress the ability of the 35-mm version to present a good picture, its economical advantages, and the fact that 35-mm could reach many more "typical" theatres much more quickly than 70-mm. The Paramount Theatre is considered typical of the architecture that was being produced in the 20's and 30's.

### Head-On Projection

An improvement that Todd would like to get wherever possible is head-on projection. Such an installation was made in Asbury Park, where a special "platform" was erected. The Walker Hi-Gain white screen is 20 by 40 feet, has only a 3-foot curve, and a brightness gain of 1.5 with only a 15 per cent fall-off.

Installation was hurried, being done in less than a week—horns were flown in from Los Angeles, and the screen from St. Louis. Supervising were Allen Smith and William Nafash of National Theatre Supply, New York; Walter Compton of Altec, and Rocco Dillione, chief projection engineer for Walter Reade Theatres.

Equipment-wise, the set-up in New Jersey is more simplified than the requirements at the Esquire Theatre in St. Louis, the initial installation for the 35-mm version. Basically, the New Jersey house has put in the Walker screen, 2 National Excelite 135 lamps with 18-inch cold reflectors (11-mm carbons) operating at 110-120 amperes, Simplex X-L projectors with water-cooled gates, 3 Strong selenium rectifiers, a complete 4-channel Simplex X-L 546-322 magnetic sound system, 8 Simplex auditorium surround speakers, 20 Altec Lansing auditorium speakers, plus the usual accessories, including the heavy duty Simplex bases with X-L soundhead arms for level throw.

Considering that each theatre presents its own installation problems, this equipment is not necessarily typical. Those theatres that are already equipped with large screens, an efficient magnetic sound system, and what the Todd firm would consider reasonably level projection can measurably reduce installation expense.

### Relaxed Requirements

Relaxation of previous Todd requirements concerning 35-mm showings indicates that the Perspecta integrator for the sound system and the special Panavision-developed anamorphic unit need not be used, provided a comparable set-up may be acquired. However, Todd is insistent on his reserved-seat road-show policy. A comprehensive manual concerning this policy is now being prepared by the Todd staff, to be given exhibitors. Also, those theatres that have inadequate or bad seating will have to alter that situation. Popcorn is still persona non grata. In short, theatres showing "80 Days" will operate in much the same way as the legitimate stage houses do. It is not expected that "80 Days" will ever go into general release.

At the moment, Todd is involved with the production of his next feature, "Don Quixote," which is being shot in 65-mm, but which will be printed down for distribution. Whether or not there will be large release prints is still in question.

Exhibitors attending the presentation were impressed by both the picture and Todd's sales talk. Included was a demonstration of distortion caused by high projection angles — the former projection booth in the Walter Reade Paramount Theatre had an angle of about 23 degrees. The throw is around 80 feet.

There are still many exhibitors who prefer the 70-mm version, despite the additional cost. In a public statement, Douglas Netter, vice-president of Todd-AO, agreed that the 35-mm print-down of "80 Days" was "probably better than any other 35-mm film around," but added: "it's foolish to pretend that it can compare with the results from a big area negative projected direct to the wide screen." To date, the 70-mm equipment is in 49 houses in this country, and in 6 overseas. Complete equipment costs $13,500.

# MagOptical Manual Now Available

AN INSTRUCTIVE manual, designed to clarify the alterations necessary for, and the use of MagOptical prints has been prepared by the 20th-Fox research and development department, and is now being mailed to exhibitors. 20th-Fox has announced that all of their CinemaScope product will be available on MagOptical, which carries both four stereophonic magnetic tracks and single optical soundtrack. The booklet, written primarily to acquaint the exhibitor with the characteristics and necessities of MagOptical, also suggests that he pass it on to the projectionist.

The following instructions are outlined in the manual:

In a theatre equipped for magnetic sound, aperture plates of 0.839 inches by 0.715 inches are to be installed for head-on projection. For high projection angles, under-sized apertures are required, filed to fit the individual theatre screen. The adjustment of the projector should be checked so that the center of the picture is on the center of the screen, and, if necessary, the screen side masking should be readjusted.

### Small Sprockets a Must

In a theatre now equipped only for optical sound reproduction, it is first necessary to change all projector and soundhead sprockets to the smaller CinemaScope type, including intermittent sprocket pressure shoes and keeper rollers. Aperture plates should be changed as required. Pins on splicers must be changed to fit small perforations. And all metal parts of projectors, tools and film equipment that come in contact with magnetic tracks, including splicers, rewinds and the like must be demagnetized. This is, of course, necessary, since magnetized equipment that comes too close to the magnetic sound tracks will introduce noise into the tracks, although it may not be heard on the running when the damage is done.

The manual points out that it is not necessary to demagnetize at frequent intervals. If degaussing is done properly, equipment need not be again completely demagnetized for long periods, unless critical parts are replaced, or strongly magnetized tools are used—these would include pliers, screwdrivers, or wrenches that have been used in the lamphouse near the magnets. Critical parts to be demagnetized are the intermittent and other sprockets, intermittent shoes, gate rails, and sound reproducer drums.

The booklet cautions against using old sprockets which have been modified to fit CinemaScope sprocket holes, except in emergency, since it is reported that reworked sprockets shorten film life by reason that they are too small in diameter, and the teeth have incorrect spacing across the film. A base diameter of 0.950 inches and 0.953 inches is given

for intermittent sixteen-tooth sprockets. It is also noted that, while all service companies have installed CinemaScope sprockets on machines which have been repaired, sprockets in the soundhead have not always been changed.

### *Alteration Cost*

Prices quoted for a complete kit of sprockets, intermittent shoes, keeper rollers, and new aperture plates range between $50 and $65 per projector. If some of the necessary parts have already been installed, the cost, of course, will be less.

Since the optical track on MagOptical prints is not as wide as that previously supplied, steps in recording have been taken to compensate as nearly as possible for any level loss. Although it is suggested that in some theatres a slightly higher fader setting may be required, MagOptical tracks are claimed not to be susceptible to trouble any more than standard optical, and all that is required is ordinary good maintenance of projection equipment.

20th-Fox believes that MagOptical prints will be a valuable aid in eliminating the booking problem, since these prints are interchangeable.

The manual also notes: "Some of the public may not know the difference between good and bad sound, but a surprisingly large number of people do."

## OBITUARIES

Siegel, David, 59, member and former official of Toronto Local 173, was killed in an automobile accident on July 30. He was projectionist at the Casino Theatre in Toronto since it opened, and chief supervisor of theatre projection equipment for Premier Theatres. A member of the Local for 41 years, Dave Siegel served as president, member of the executive board, and as chairman of welfare fund. For many years he represented the Local at IA conventions. He was a member of the Variety Club and of the Canadian Picture Pioneers.

Survivors are his wife, Mary, his son and three grandchildren.

• • •

Miller, Robert E., 65, member of St. Louis Local 143, died last month of a heart attack. He worked as a projectionist at Loew's Orpheum there. He is survived by his wife, Emma, and his son, Robert W., also a member of the Local.

• • •

McDonald, John, veteran member of Detroit Local 199, died recently. For the past 30 years he was projectionist at the Fisher Theatre there, and was commander-elect of the theatrical post of the American Legion.

• • •

Kalushe, Paul Frederick, member of Local 154, Seattle, Wash., and projectionist at the Music Hall Theatre in Seattle, died early this month.

## PERSONAL NOTES

Dr. Max Herzberger of Kodak Research Laboratories, head of optical research in the physics division of the laboratories, has been honored for his studies in geometrical optics and related science by election to the Bavarian Academy of Science. The Society, founded in 1759, is one of the old limited-membership academies that were the centers of cultural and scientific life prior to World War I. Before joining Eastman Kodak in 1935, Dr. Herzberger worked for Leitz and Zeiss in Germany, and lectured on optics at various universities in Holland.

At Berlin University he studied under Albert Einstein, and later renewed this association when a member of the Institute for Advanced Study at Princeton University in 1946. Author of a volume, "Ray Optics," Dr. Herzberger has been working on a new book for some years which is to be published this spring.

* * *

General Precision Laboratory has anounced two new executive promotions. Dr. Raymond L. Garman, formerly executive vice president of the firm, has

Dr. Raymond L. Gorman

James W. Murray

been named chairman of the board, but will continue on as technical director in charge of research and development. James W. Murray has been elected president and chief executive officer, continuing as general manager.

* * *

Charles G. Rose has been appointed manager of the Memphis district, RCA Service Co., Inc. For the past three years New Orleans branch manager, Rose joined RCA in 1948 as a television installation and service technician at the Memphis factory service branch. He succeeds P. H. Brune, was was recently appointed service manager of Consumer Products, Southwestern region.

* * *

Dr. James A. Krumhansl, formerly assistant director of the Parma Research Laboratories of National Carbon Co., has been appointed its associate director. Before joining National Carbon in 1955, Dr. Krumhansl taught physics at Cornell and Brown, and worked on microwave and pulse communications for Stromberg-Carlson.

* * *

Frank A. Ungro, treasurer of Westrex Corporation, has been elected to the post of executive vice-president. He has been associated with the motion picture

Frank A. Ungro

equipment industry since 1928, and has done extensive traveling abroad in connection with his duties with Westrex. He was succeeded in the post of treasurer by R. A. Colistram, who will also remain as comptroller of the corporation.

* * *

Vernon 1. Weihe, formerly assistant to the vice president in charge of engineering at Melpar, Inc., has joined the Avionic division of General Precision Laboratory. He will direct the Avionic Systems planning activities from Washington, D.C. Weihe has been chief engineer of the Communications and Navigation laboratory at Wright-Patterson Air Force Base in Ohio, as well as serving for many years as air navigation and traffic control planning engineer for electronic systems with the Air Transport Association.

* * *

Edwin L. Grauel takes over the post of assistant advertising manager of Eastman Kodak Company. Joining the company's advertising department in 1930, Grauel

Edwin L. Grauel

was later made business manager of the department, with duties in budget planning, accounting and cost control, media buying, and other business operations. In 1952 he was appointed assistant director of advertising.

* * *

D. L. "Danny" O'Brien has been made division manager of Altec Service Company's western division, with headquarters in Beverly Hills. With Altec since its formation in 1937, O'Brien was formerly branch manager of the western division. Altec also announces the appointment of M. L. Scott and H. J. Nelson as field managers of the Los Angeles and San Francisco areas, respectively.

* * *

John P. Taylor has been appointed to the new post of manager of Marketing Plans and Services of RCA Industrial Electronic Products. His previous position as manager of Advertising and Sales Promotion will be filled by Herman R. Henken. Taylor will be responsible primarily for the formulation of broad marketing and service plans to meet the electronic needs of business and industry. He has been with RCA since 1930, and in 1952 received the RCA Victor Award of Merit, the company's highest award to salaried employes.

* * *

A. Dexter Johnson has been appointed advertising manager of Eastman Kodak Company, assuming the responsibilities of the general working opera-

A. Dexter Johnson

tions of the department. With Kodak since 1934, Johnson was named assistant director of advertising in 1952, and acting general manager of Kodak's Pacific Northern Sales Division in San Francisco last year.

* * *

Frederick R. Lack, associated with Western Electric since 1911, will succeed Eugene S. Gregg as president of Westrex Corporation. He will continue on as vice-president of the radio division of Western Electric. He has been a member of the board of directors of Western Electric since 1945, and a director of Westrex since 1947.

* * *

Eastman Kodak Company has announced seven new appointments in the International Division. Anthony Frothingham has been appointed assistant manager for Europe; Thomas F. Cannon succeeds Frothingham as manager of the European Office (Paris); Robert F. Edgerton is transferring to the European Office from the Division's Rochester headquarters; Hugh J. Knapp has been appointed assistant manager of the Export Sales department in Rochester;

W. David Thompson is transferring to the Export Sales department from Kodak Philippines, Ltd.; Malcolm R. Maguire is transferring to the International Division from Kodak Hawaii, Ltd.; Merwin Wall succeeds Maguire as manager of cine processing at Kodak Hawaii, Ltd.

* * *

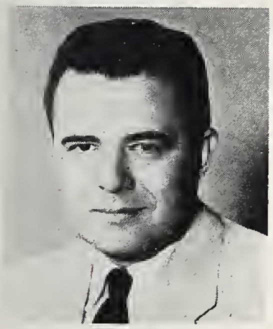
Francis J. Ford has been named manager of amateur cine advertising for Eastman Kodak Company. Prior to joining Kodak, Ford was associated with a number of New York firms in the advertising field, and was sales promotion director for National Distillers.

* * *

Wadsworth E. Pohl, technical director of the motion picture division of Technicolor Corp., is this year's recipient of SMPTE's Herbert T. Kalmus Gold Medal Award. The award, instituted in 1955, is presented each year to "an individual who has made an outstanding contribution in the development of color films, processes, techniques, or equipment useful in making color motion pictures for theatre or television use." Pohl has made several contributions to improved methods of manufacturing color motion pictures. He holds patents in fields such as camera optics, film processing, and traveling mattes.

* * *

C. E. Ford has been appointed to the newly-created post of new products marketing manager of National Carbon Company. That organization will be responsible for developing industrial markets and keeping in close touch with industry to anticipate demand. Ford has been with National Carbon since 1937, and was formerly the manager of chemical product sales.



C. E. Ford

### Ace Lab Closes

Ace Film Laboratories, a Warner Bros.' subsidiary and fourth largest processing depot in the east has shuttered. Warner processing is to be moved to its West Coast laboratory.

# Projectionist License Exam Questions

CONTINUING with this quiz show, here are a few posers that should offer you no trouble at all. Even if one stumps you, 75 per cent remains passing, just as in the official exam. Peek later at page 29 for correct answers.

1. The douser of a projector is:

(a) a device for putting out the arc; (b) a shutter for causing the film pictures to be projected individually and successively to the screen; (c) an opaque iron plate for shutting off the light from the arc to the film when the machine stops or the film runs out, and (d) a gadget for keeping the arc cool.

2. How many frames are there to one foot of 35-mm film?

(a) 12; (b) 16; (c) 18; and (d) 24.

3. If the picture on the screen is "out of frame" it may be brought into frame by:

(a) shifting the borders of the screen; (b) adjusting the speed of the motor; (c) adjusting the picture gate up and down. and (d) increasing the tension of the pressure pads.

4. The sound-track of a film is:

(a) a track near one edge of the film carrying an engraved record of the actor's voice. similar to the phonograph record; (b) a track near one edge of the film carrying a photographic image of a light-beam that has been caused to vary in accordance with the actor's words; (c) the photographic images of sound waves superimposed on the pictures of the actors, and (d) the photographic images of sound waves across the film between frames.

5. Sound is reproduced from sound-film by:

(a) a stylus, or needle, running in grooves in the soundtrack; (b) a microphone in contact with the sound track and falling upon a photoelectric cell; (c) a photoelectric cell causing light to shine upon the sound track. and (d) none of the foregoing.

6. The sound corresponding to each picture frame is:

(a) exactly adjacent to the frame; (b) 16 frames behind the corresponding picture image; (c) 20 frames ahead of the picture image, and (d) 4 frames ahead of the picture image.

7. As the film passes the sound aperture:

(a) it moves steadily and uniformly; (b) it stops at every frame; (c) it slows down and speeds up in time with the frame, and (d) it stops and starts at every other frame.

8. In threading a projector a free loop is allowed in the film ahead of the picture gate, known as the "film-loop" or "Lathan loop." Its purpose is:

(a) to keep the film from binding; (b) to prevent vibration of the film; (c) to prevent the jerking motion of the intermittent from breaking the film, and (d) to keep the picture on the screen steady.

9. Cellulose acetate motion picture film is:

(a) slow burning; (b) highly inflammable; (c) non-inflammable. and (d) non-poisonous.

10. Whenever the film is not running through the gate at the operating speed:

(a) the arc should "go out" automatically; (b) an automatic shutter should shield the film from the light of the arc; (c) the sound system should be disconnected automatically. and (d) the entire machine should stop automatically.

11. The exciter lamp is used in a projection machine to:

(a) excite the condensers in the amplifier; (b) excite the photoelectric cell in the soundhead; (c) to increase the illumination of the screen, and (d) to illuminate the condenser lens.

12. The purpose of the threading or framing light is:

(a) to keep the picture in frame on the screen; (b) to provide light inside the picture head; (c) to check the alignment of the arc, and (d) to check the focus of the lenses.



## SCIENCE NOTES

"REFRACTASIL," a unique silicon liquid designed to produce scratchless photographs is now being offered by General Electric. The silicone, according to GE, completely fills scratches made on the non-emulsion side of the negative. A special 35-mm negative holder to allow complete immersion of the negative is also provided.

* * *

A DUPLEX MICROFILM CAMERA that photographs both sides of a doccment simultaneously at any of three reduction ratios has been developed by Remington Rand. This compact camera doubles 16-mm film capacity by filming up one side and down the other. Readily interchangeable lenses are available for 25 to 1, 35 to 1, and 42 to 1 reduction ratios.

* * *

FOGGY REPRODUCTION? The Armour Research Foundation has established that there are approximately 15 billion particles in cigarette smoke. Puffs of smoke averaged from two to six milligrams, and a puff from a filter-tip cigarette was found to contain half as many particles as a plain cigarette, with corresponding weight being down about 40%.

* * *

A REWINDING and cleaning machine that automatically does both in a single operation is now in use at General Film Laboratories in Hollywood. A new type of combination air and vacuum squeegee permits cleaning of 3,000-foot rolls at 360 feet a minute.

* * *

NEW PLASTICS tough enough for automobile bodies, aircraft, and structural members for buildings will come from treat-

ment of ordinary plastics with high-energy atomic beams, according to Shell Development Company. Nuclear bombardment was predicted to do for plastics what forging did for iron and vulcanizing for rubber.

* * *

A Daylight TV Screen that will permit good viewing even under bright room lighting has been developed at the Naval Research Laboratory. Instead of the opaque powders now in use, phosphor is deposited on the TV as a thin transparent film. This causes sunlight to go through the film and be absorbed in the tube's darkened interior, instead of being reflected as is done by conventional powder phosphors.

* * *

Hot Solder, composed of 95 per cent zinc and 5 per cent aluminum, and special flux can be used to join all aluminum alloys, and make joints between aluminum and other metals such as copper, brass, steel, or nickel, according to Alcoa. Solder melts at 715 to 725°F., thus reducing joining costs by making high temperature joints that heretofore had to be brazed or welded.

* * *

A Leak Detector—a new paint that locates holes, cracks, and fissures causing leaks—has been developed by Boeing Airplane Co. Any hole or flaw in an assembly or container through which a gas can pass can be detected immediately by this paint. The leak is marked by the paint for a long period of time, and then easily removed by flushing with water, cloth wiping, or by air streams.

* * *

New Microscope for machinists and toolmakers has been announced by Bausch & Lomb. The principal feature is a unique illuminating system that permits true vertical illumination — a light source that is built in, the beam directed down through the microscope objective. A collective mirror under the stage plate reflects light back into the body tube. This allows both surface and contour of parts to be viewed simultaneously.

* * *

An Atomic-Powered Battery no bigger than a cough drop may be commercially available in about three years, Elgin National Watch Co. and Walter Kidde Nuclear Laboratories, Inc. report. The battery is said to be completely safe and capable of delivering usable electricity for at least five years. Physical reaction between tiny silicon photo-cells and phosphor materials convert Beta rays to light, and light to electricity.

* * *

Geneverters, two new series of converters, have been introduced by the Carter Motor Co. The series consists of 12 small size, light weight Geneverters, and 40 heavier Mark II super converters. The DC to AC Geneverter is designed for control circuits and industrial applications not requiring a larger converter, but still needing a reliable rotary power source. The 12 models operate from 12, 24, 32, and 115 volts DC input, with 20, 40, or 60 watt capacity. The Mark II converters, used in controls and tape recorders, incorporate long life brushes, lifetime lubricated ball bearings, and improved commutation. They operate on 6, 12, 24, 32, 38, 48, 64, 115, and 230 volts DC input, with output capacities of 40, 60, 80, 100, and 150 watts.

## Answers to Projectionist Exam

| | | |
|---|---|---|
| 1. C | 5. D | 9. A |
| 2. B | 6. C | 10. B |
| 3. C | 7. A | 11. B |
| 4. B | 8. C | 12. B |

## NEWS FROM DISTRICT 2

*(Continued from page 21)*

demonstrator, and supervisor of theatre projection equipment installations.

During the early 1930's New York Local 306 organized a new service committee—The Inspection Department. The members of this committee were Dave Narcey, Frank Lechman, Tom Lloyd, Robert Reiner, Tom Mele, Morris Duboff, and Paul Hirsch. Narcey was appointed supervisor of this group. The function of the Inspection Department was to collect practical and technical data on projection and sound equipment and to make it available to projectionists having difficulty in converting to what was then a new medium of theatre entertainment.

Also, about that time Narcey, with the cooperation of a close friend, took over the Motorized Talking Picture Service Co., distributor of portable RCA equipment.

Along about 1933 Dave felt the need to slow down the hectic pace he had been pursuing for 20 years and he began to restrict his activities. He eventually confined himself to projection work in theatres and studios in Local 306 jurisdiction. In 1941 he was assigned to the preview room at the Music Hall where he remained until failing health forced his retirement in 1953.

My interviews with Bert Salisch and Dave Narcey were experiences I shall never forget. Their combined knowledge of the craft and experiences in the early days of motion picture, plus the devotion and service to their fellow craftsmen are unbeatable.

## TV & MOTION PICTURES

(*Continued from page* 19)

screen. As electrons fall upon the crystal screen, the difference of potential caused by secondary emission will rotate the light beam at such points and allow some light to pass through. Thus, in effect, light will pass through this system only where electrons fall upon the crystal screen. The more electrons the greater the amount of light: the fewer the electrons, the smaller the amount of light. An ordinary scanning raster using intensity modulation is applied to the crystal screen. This arrangement together with suitable optical components, is capable of providing a large size projected image.

Some means must be found to prevent the picture information on the crystal screen from remaining there too long. Several methods have been used successfully to erase the screen in time for the next trace.

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EDITOR'S NOTE. Interesting and even fascinating as Mr. Lytel's text is, it does not exhaust his subject. Two additional methods of projecting large-size television pictures exist and have been demonstrated; one of them has been used commercially in routine theatre operation. These are the film-intermediate system, and Twentieth Century-Fox's Eidophore system. Both have been described in these pages but to save readers searching through back files both systems will be reviewed with extreme brevity here as a supplement and conclusion to Mr. Lytel's review.

In the film-intermediate system, the cathode ray tube image is reversed, negative for positive, so that the picture is in fact a negative and when photographed comes out positive. A continuous strip of unexposed film runs without interruption from the camera feed magazine, through the camera, through a lightproof channel to the developing machine (from which it emerges developed, printed and dried), through a motion picture projector, and finally to the motion picture projector's lower magazine. The latter may be over-size to enable it to take up an hour's entertainment or more. Both 16-mm and 35-mm film intermediate systems of this kind have been used successfully. The same arrangement also has been extensively used in TV studios to make a record of the program; although at this moment of writing studios seem to be turning to "taping" the program on magnetic tape rather than photographing it.

The time lag in film-intermediate TV projection is quite small—a minute or so. This time is partly used up in the channels which the film must traverse during its progress from camera to developer and from developer to printer. Where the geography of the theatre adds substantially to this travel time the interval between receiving the program and projecting it to the theatre screen has been as long as two minutes.

### *Hot Developers*

Aside from travel time, there is approximately one minute of time needed inside the developing machine. Here the film loops through or around a series of rollers. It is sprayed with *hot* developers which evoke the image in less than normal time because of their elevated temperature; then the film is sprayed with hot water to wash way the chemicals, and died with hot air.

Film-intermediate TV projection equipments are entirely practical in technology and economically they are not excessively expensive. Basically they consist only of a motion picture camera and a developing machine, plus a few minor extras like an oversize lower magazine. They can take any TV program from any receiver and place it before a theatre audience with all the brilliance and power of the theatre's regular arc lamps. The only reason the system is not in commercial use today is that no one has ever succeeded in making commercially satisfactory arrangements for program material.

The same essentially is true of Twentieth Century-Fox's remarkable and fascinating Eidophor system of theatre TV. The system seems to be practical enough; it works, it produces a full-size, arc-lamp lit, color TV image—but its owners cannot seem to find images to put through it. Thus, although this system has been demonstrated successfully, it has not been commercially used.

Eidophor is complex: it includes an arc lamp, a television receiver, a cathode ray tube without the fluorescent screen, a rotating table carrying a viscous liquid which is part of the CR tube, a vacuum pump, and a refrigerator! There is also a grating which is part of the optical system, and a projection lens.

### *Dimpling*

The cathode ray tube contains the usual electron gun but the electrons do not bombard a screen. They bombard the thick, transparent liquid, causing it to dimple or ripple in spots. The more

intense the electron bombardment, the greater will be the dimpling.

Light from the arc lamp is focused on the same liquid. Wherever the liquid is dimpled more or less of the light is deflected away from the bars of the grating, passes between the bars, and goes on to the projection lens and the screen. Where there is no bombardment —no ruffling of the thick liquid—the light of the arc lamp is intercepted by the grating bars and does not get through to the projection lens and the screen.

The unavoidable requirements of such a system are what make it complicated. First of all, an electron gun functions only in a vacuum, so this whole arrangement—a thick liquid bombarded both by an electron beam and by the light of an arc—must reside inside a vacuum. Next, liquids evaporate, and even though the one chosen for Eidophor has an exceptionally low vapor pressure, some of it still evaporates, especially since it is so heavily bombarded with energy. Therefore the vacuum will not stay a vacuum unless kept continually on the pump. So Eidophor includes a vacuum pump. Further, even a pump is not enough to keep the enclosure free from fumes of that liquid unless evaporation is retarded by cooling; so Eidophor includes a refrigerator!

### *Smoothing the Surface*

Finally, the liquid, once dimpled, does not un-dimple very readily; and since a smooth, unruffled surface must be provided every 1/30th of a second to accomodate the next frame the liquid is arranged in the form of a film or layer on a rotating table. A fresh liquid surface is thus provided for each fresh frame. The dimpled liquid rotates under a knife-edge that helps smooth it again; by the time it has rotated around to the starting point it is entirely smooth and ready for re-use.

Add to the above assemblage a rotating color wheel which filters the arc light so that successive frames are projected in the three primary colors and—this is Eidophor!—a television-receiver-cum-arc-lamp-cum-vacuum-pump-cum-refrigerator-cum-color-wheel-cum-a-few-other-things. But it works. It puts out a beautiful image. It is more compact than might seem possible at first thought—approximately the same size as a large modern theatre projector with lamphouse and pedestal. No doubt it would need a good deal of servicing, there being so many things about it that could go wrong or (what is even worse) go partly wrong. But this is not the basic obstacle to the commercial use of Eidophor. The finest record-player imaginable is no use if there aren't any records.]

[THE END]

## BRITISH VIEWPOINT

*(Continued from page 18)*

it must be admitted has not so far attained the importance it deserves, due partly to the apathy of exhibitors, but more to the shortage of projectionists.

Chairman of the apprenticeship council is Mr. E. J. Hinge, a former president of the CEA. Active in its deliberations are Dr. Leslie Knopp, technical consultant to the CEA, Mr. S. B. Swingler of the CMA group, and Mr. G. E. Fielding of Associated British Cinemas. The scheme is admirably conceived, and it may be of interest if I describe it.

First, apprentices are indentured to individual exhibitors, but under the supervision of the apprenticeship council; this means that if for any reason an apprentice wishes to move to another theatre, he can do so by agreement with his employer, without losing any of his rights under the indenture.

### *Four Years Training*

A youth 16 years of age first serves for six months as a junior, to give him a taste of the job. He can then enter into indentures for a period of four years, which period includes this six months. At the end of this time, he is reckoned to be qualified to take a job as third, or as second in a small theatre.

It is the intention of the apprenticeship council that the apprentices shall receive one day's tuition a week at an approved training center: but unfortunately nowhere except in the London area, and in Leeds (center of the Yorkshire industrial area) do such training centers so far exist. Two technical colleges in South London run these courses, and both are equipped for practical as well as theoretical instruction.

The syllabus of instruction—which it is intended shall be standardized throughout the country—starts with the assumption that the youth will have forgotten most of the mathematics he learned at school, and from elementary principles brings him up to the level of logs, vectors and sine curve. Electricity covers AC calculations and apparatus, and sound, acoustics, and general science are included, as well, of course, as all aspects of projection, including regulations.

The syllabus is perhaps a little biased on the theoretical side, but this is due to the insistence of the Ministry of Labour, who will not support a scheme providing only practical instruction—in the long run a very good thing.

The provision of training centers in other towns is envisaged. Unfortunately there will always be a majority of apprentices in the country theatres, remote from any training center, and for them it is proposed to organize a correspondence course. With the hope of attracting more youths to the scheme, a leaflet has been prepared which is to be distributed through youth employment officers and through branches of the CEA and NATKE.

## VARIABLE-DENSITY

(*Continued from page* 11)

which shows that while his remarks are true in reference to Western Electric type light valves of the 1928 period, they certainly do not apply to the more modern type of light valve modulators used in the Western Electric (Westrex) sound recording systems[4].

The introduction of the so-called Wente cyclindrical lens close to the film plane in present-day variable-density modulators makes the recording essentially variable intensity rather than variable time. This is due to the fact that the image height never exceeds the circle of confusion of the modulator optical system. Coincident with improvement in optics, there has been a vast improvement in light valve design. With Alnico V permanent magnets, the new sealed light valve has an insignificant resonance peak, and is linear over approximately a 60 db range.

### *Variable-Density Awards*

Apart from these technical considerations, critics of variable-density recording will have a difficult time explaining away the fact that during the period extending from 1930 to 1946, the Academy sound awards were given to only three pictures recorded with variable-area, the rest going to Western Electric recorded pictures. Since that date the issue has become confused by the introduction of variable-area by Westrex, and also by the use of magnetic tracks for both original and theatre reproduction. Surely the overall evaluation by the industry over a period of many years cannot be ignored.

Anybody defending the virtues of variable-density recording must face the fact that there has been a noted swing to variable-area in recent years. In my opinion this swing has little, if anything, to do with the relative merits of the two recording systems, but can be traced to technical innovations which are favorable to the use of variable-area. For example, the use of negative-positive color films has resulted in an increase in the use of variable-area since it was felt that the variable-area would be somewhat easier to handle.

This opinion, however, is not held by all experts in the field, and the movement to variable-area might conceivably be reversed at any time. The proposed use of magoptical recording has favored variable-area largely because the reduction of variable-density track to one-half its width would be undesirable in many theatres with insufficient amplifier gain. The growing popularity of direct-positive recording in intra-studio operations also favors the use of variable-area.

In summary, it may be said that both variable-area and variable-density are capable of giving excellent sound quality. There have been vast improvements in recent years in both systems, and in the sound emulsions available for these recordings. Both systems require precise laboratory control, and in the opinion of this writer, anybody suggesting either one is immune to such control is doing a disservice to the motion picture industry.

1. "Elements of Sound Recording," Frayne and Wolfe, p. 350 et seq., John Wiley & Sons, Inc., 1949.
2. "Elements of Sound Recording," Frayne and Wolfe, p. 386, John Wiley & Sons, Inc., 1949.
3. "Modulated High-Frequency Recording as a Means of Determining Conditions for Optimal Processing," J. V. Baker and D. H. Robinson, Journal SMPE, vol. 30, p. 3, January 1938.
4. "An Improved 200-mil Push-Pull Light Valve Modulator," J. G. Frayne, T. B. Cunningham, and V. Pagliarulo, Journal SMPE, vol. 47, p. 494, December 1946.

## VARIABLE-AREA

(*Continued from page* 11)

when the scanning slit departs from correct azimuth. Spurious harmonics are thus generated; but azimuthal errors so gross as to make these harmonics audible as distorted sound simply do not occur in the field. Speaking from practical experience, the writer has never once encountered azimuthal maladjustment of the sound-head optical tube in any theatre.

My reference to the ease of noise-proofing v-a tracks was concerned mainly with the ease of visually checking the effectiveness of v-a biasing. Visual inspection of v-d tracks yields less definite information.

### *Modulate-Beam Restrictions*

It is true that conscientious lab engineers daily strive for optimal densitometric control with both types of soundtrack, and in negative and positive records. But the fact remains, Doctor Frayne's statement to the contrary, that the densitometric requirements of v-d tracks are relatively critical. If this were not true, so many studios would not have switched to v-a tracks for multilayer color prints.

"The density of variable-area tracks may vary over considerable limits with remarkably small sound-output variations. This, of course, permits *considerable latitude in laboratory work without sacrifice of quality or volume output.*" (Ralph H. Townsend, RCA.) It is only necessary to avoid a track density so great that the finer striations of the high-frequency waveforms are attenuated in reproduction by fog. Such great exposure and processing latitude is not allowable in any system of v-d track production, for the modulated-beam method does not tolerate use of the low-exposure "toe" nor the high-exposure "shoulder" of the emulsion scale, and the glow-tube method employs only the toe, and fails in the straight-line portion of the exposure curve.

From the standpoint of actual practice, we encounter much larger variations in v-a track densities every day than are permissible in v-d tracks. These do not appear to affect reproduction in any way. We even find obvious errors in v-a tracks which, however, produce no detrimental effects in the sound. The existence of such errors as incorrect lateral adjustment of biasing valves reveals that perfection in commercial practice is the exception, not the rule. V-a tracks are remarkably tolerant of many kinds of errors and, furthermore, make such errors readily visible.

Variable-density recorders of truly *variable-intensity* characteristics were referred to by the writer as instruments of the "modulated-beam" type. The practical functioning of improved Western Electric recorders as devices of this class is assuredly acknowledged, as is also the well-known excellence of Westrex sound-recording apparatus. No deprecation of Westrex sound equipment was intended.

### *Need for Careful Control*

While the writer is admittedly less than overawed by Academy awards in any department of movie production, the recognized need for careful control in recording and film processing when the v-d method is used may well be a contributing factor to the general excellence of commercial v-d feature-film tracks. Simpler methods invite carelessness. But on the other hand, and in spite of back-slapping in Hollywood mutual-admiration societies, the sound quality of v-d tracks

from one of the major American studios has been severely criticized by European projectionists. It would appear that the widespread preference for variable-area tracks has solid scientific and economic reasons.

## PRINT PROBLEM

(*Continued from page 8*)

if it would be better to provide a color cue of proper color contrast with the scene and to adopt a figure capable of greater resolution — such as the asterisk * —rather than the round dot. By the way, in anamorphic prints this figure becomes an ellipsoid and this should be corrected at the same time.

### *Framing Index Marks*

Other cues for which credit is due are those provided in 35-mm prints obtained from the wide-film processes. These framing index marks are invaluable to the projectionist since they provide a sure means of providing correct head-room for the scene whether it is projected in 1.66 to 1, 1.85 to 1. or 2 to 1 aspect ratio. In previous product bearing these marks at the beginning of the reels, some restraint has been noted and the projectionist is very likely the only person who noticed the marks. This is as it should be.

The writer dislikes to point the finger of direct criticism at anyone. This is especially true when the act complained of is intended to make the projectionist's job easier and more compatible with the director's intent. However, it must be said that in the case of "The Ten Commandments," the frame reference marks were so intense and so obvious that laymen were heard to wonder why a roadshow presentation used "a print that was full of scratch-marks." Unfair as such remarks might be, they do point up the necessity for the attention of the industry to such things as we have been discussing in this article. Increased admission prices do make the public more critical, and we in the industry should be the leaders in the march of progress.

## FilMagic's New Automatic Silicone Lubricator

A new device for automatic silicone lubrication of recording tapes and motion picture film has been marketed by FilMagic Silicone Products, producers of FilMagic cloth and tape. The product, named FilMagic Pylon, is claimed to be the first practical application of the principle that silicone lubrication is most effective when applied close to the point of use.

The Pylon kit ($2.95, F. O. B., Distributor's Group, Inc., 204 14th St., N. W., Atlanta 13, Georgia) contains a pylon—supplied either with suction-cup or a flange-type mount which can be permanently installed on most equipment —a plastic squeeze-bottle of FilMagic silicone re-loader, and six sleeves of FilMagic cloth, plus complete instructions for installation.

Operation of the automatic lubricant requires activating the filler with the silicone fluid, which is then fed in controlled amounts through a sleeve of cloth onto the tape or film. The pylon is mounted between feed reel and reproducing parts of the equipment for continuous performance while the machine is operating.

The company claims that point-of-use lubrication should insure better sound reproduction, reduction of "wows," less head wear, and smoother, cooler operation.

A number of tape manufacturers employ the use of silicone lubricants during the manufacturing process.

A New Edition of "The Kodak Movie Photoguide," which Eastman Kodak Company describes as a pocket encyclopedia of movie-making, is now off the press. The 32-page booklet has been revised to include recent developments in equipment and techniques for both amateur and advanced movie-makers. It also contains a section of all 16-mm Kodak black-and-white films, exposure information for different movie-making situations, and special effects that can be obtained through the use of interchangeable lenses. Fingertip information of exposures and running time of 8 and 16-mm film is provided by a computer dial in the book.

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## PAR'S TELEMETER

(*Continued from page* 13)

hibitors, local broadcasters, publishers, sports promoters, and others in the entertainment field. Franchise holders would be responsible for leasing, installing, screening, and collecting in his locality, operating as a separate entity, but coordinating both locally and nationally. Program booking would be done locally.

Emphasizing the fact that the spiralling costs of TV productions has caused the single advertiser to balk at taking on whole expense, Telemeter maintains that not only will the system bring on a new source of revenue, but enable producers to increase the volume and quality of their product. For live national events, such as the World Series, which would bring up the problem of negotiating tollvision rights, it has been indicated that a non-profit booking organization might be set up.

At present, International Telemeter is planning on the use of coaxial cables for the more heavily populated sections, although it is possible that in sparsely settled areas an open wire would be used. Concerning the lesser inhabited spots, it has been estimated that Telemeter could operate profitably with 2,000 or less installations.

Telemeter stresses three main points: it is on a cash basis, it allows a variable price, and definite information concerning popularity of programs are available to exhibitors, producers, etc.

The closed circuit operation is expected to be available to consumers by the end of the year. Initial commercial deal has been made with Fox West Coast Theatres, but they are not expected to join in until after the turn of the year. Other deals are said to be in the signing stages.

### *Some Pertinent Problems*

At a recent guided missile exhibit in New York City, guides were somewhat chagrined to find that youngsters between the ages of 6 and 15 asked more complicated, informed questions than adults. What then, ask some exhibitors, is to prevent hi-fi-hep students—not to mention many trained engineers—from unscrambling the TV picture on their own, without paying? Telemeter maintains that its particular system is fool-proof, and if any bootlegging did occur, the coin box would reveal it.

Another problem is collection. Whatever the means, it may well be that the salaries of collectors would exceed the individual take, plus the manpower problem.

These, and a good many more obstacles must still be dealt with. But it must be noted that not only Paramount, but Skiatron, Telemovies, and other systems have gone all-out to promote their systems, and have spent too much money in development to turn back.

---

## Bureau Films Set Record

Last year more than 14 million persons viewed motion pictures produced by American industries in cooperation with the Bureau of Mines, an all-time high for the Bureau's 37-year-old industry-Government film program. In addition, about 28½ million others saw noncommercial telecasts of the films, the Bureau said.

The films are produced by private firms or industrial organizations which pay all the costs, and the Bureau of Mines distributes them on a free-loan basis to universities and other educational institutions, industrial firms, business and civic clubs, scientific societies and other organizations.

The pictures—all in 16-mm sound, and most of them in color—contain no advertising. To date there are more than 6,400 prints of 61 film subjects dealing with the nation's various mineral resources. They are distributed from the Bureau's Central Experiment Station at Pittsburgh, Pa., and through voluntary subdistributing centers in 38 states, Alaska, and Hawaii.

---

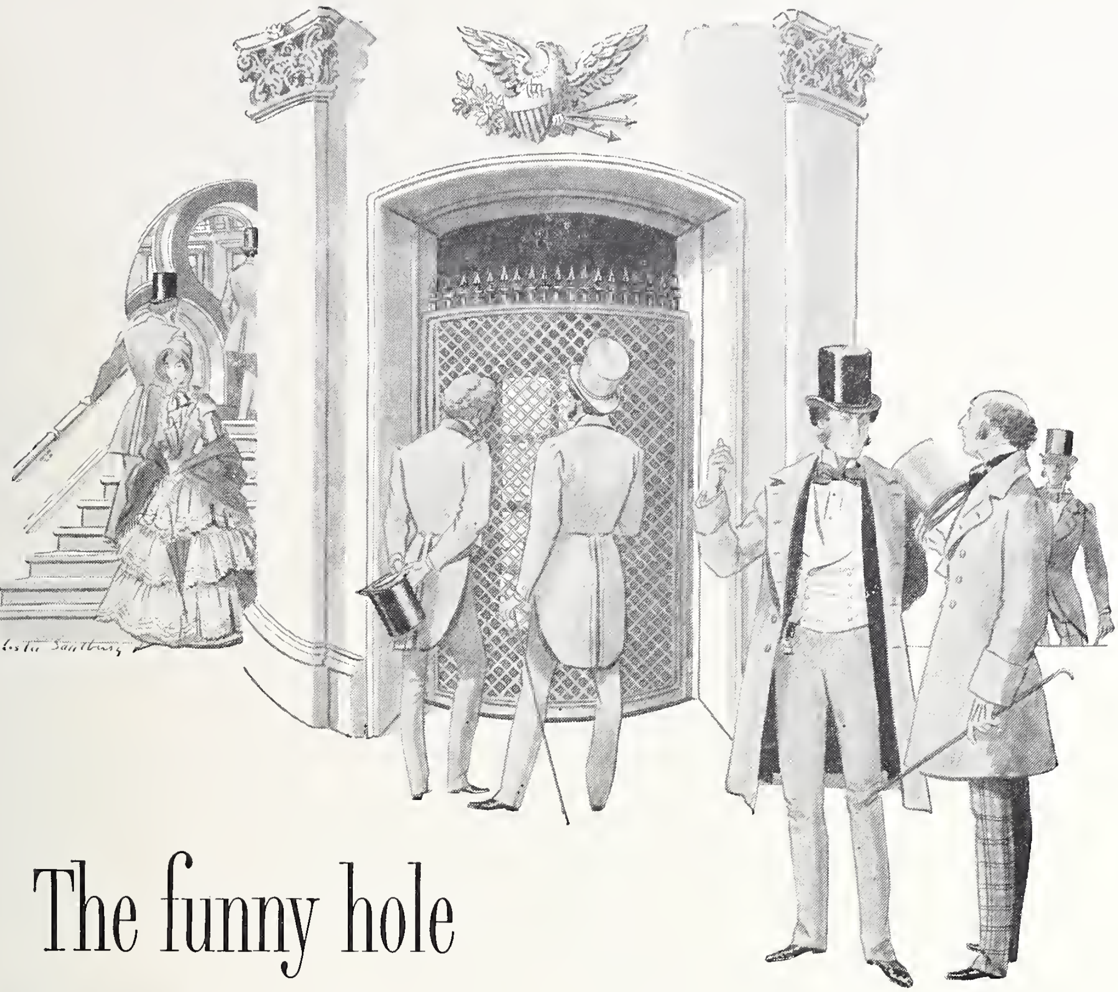
## Hardtops Strike Back

To counter the crepe-hanging "bunk" that the hardtop theatre is "doomed." irritated and impatient exhibitors have taken it upon themselves to correct the latest trickle of erroneous information disseminated about theatre operation. Plans afoot by both TOA and Allied States Assn. provide for a vigorous and aggressive public relations program to stress the four-wall houses' importance to the community as a social force and a business aid, as well as an entertainment outlet. Cooperation with local restaurants and other businesses is one of the aims of the drive.

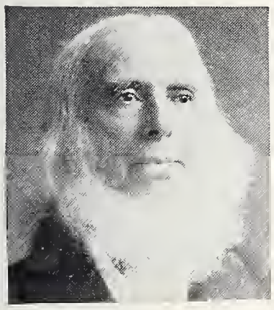
---

## Projection Art Work Pamphlet

How to make art work which is intended for 35-mm movies, slides, filmstrips or TV conform to camera apertures is explained in a six-page pamphlet issued by Eastman Kodak under the title "Art Work Size Standards for Projected Visuals." Art prepared according to these standards will be easier to prepare, more certain to be legible, uniform and convenient to file. Single copies of the pamphlet are available without charge from Sales Service Division, Eastman Kodak Co., Rochester 4, N. Y.



# The funny hole in Mr. Cooper's building



MANY a New Yorker shook his head, and not a few snickered, when they saw the "hole" in Peter Cooper's new building.

But to the benign gentleman with the ruff of graying whiskers it was all so simple: Some day someone would perfect the passenger elevator.

The mere fact that there wasn't one in 1853 would mean little to a man who, with his own hands, had built and driven the first American locomotive. Whose money, and faith, were to help see the Atlantic Cable through all its disasters to final success. And who would "scheme out" a Panama Canal plan fourteen years before DeLesseps.

But Peter Cooper's belief in the future ran in a vein far deeper than simply the material. For his "building with a hole" was Cooper Union, the first privately-endowed tuition-free college in America. A place where young men and women of any race, faith, or political opinion could enjoy the education which he, himself, had been denied. Peter Cooper's dearest dream—which has continued to grow dynamically for nearly a century and today enriches America with thousands of creative thinkers, artists, and engineers.

There is plenty of Peter Cooper's confidence and foresight alive among Americans today. It is behind the wisdom with which more than 40,000,000 of us are making one of the soundest investments of our lives—in United States Savings Bonds. Through our banks and the Payroll Savings Plan where we work, we own and hold more than $41,000,000,000 worth of Series E and H Bonds. With our rate of interest—and the safety of our principal—guaranteed by the greatest nation on earth. You're welcome to share in this security. Why not begin today?

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OCTOBER 1957

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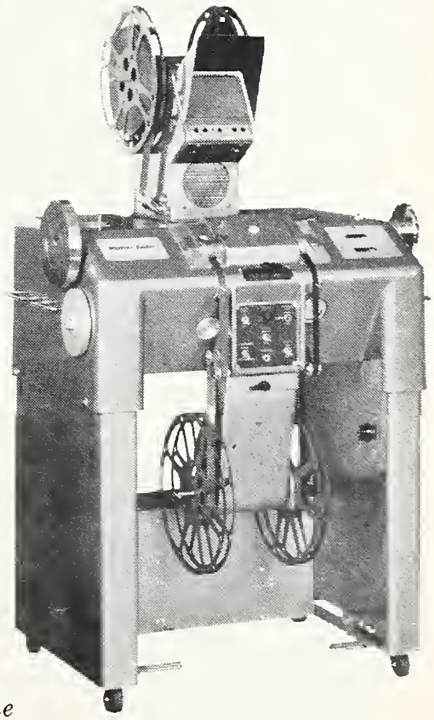

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# International PROJECTIONIST

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R. A. MITCHELL, *Contributing Editor*

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# Monthly Chat

## The Professional Projectionist

PROFESSIONAL PROJECTION is more than a skilled craft or a mechanical art. Operating an installation of sound-projection equipment in a modern motion-picture theatre is quite different from operating a spinning machine or a punch-press. There is no machine in existence as "personalized" as the motion picture machine, no other process which affects human emotions so profoundly as the projection process. Projection, like medicine or music, is no mere "trade," but a *profession*.

A few exhibitors, however, resemble the five foolish virgins of biblical lore. They refuse to supply the "lamp" of highly complex projection equipment with the "oil" of expert supervision by competent *professional* projectionists. Any boy with spare time on his hands and a desire to pick up extra cash is too often placed in charge of equipment which demands experience and specialized knowledge on the part of its operators. And no matter how cheaply the boy-projectionist works, it's costly.

We deplore the poor sound and projection results usually inflicted upon longsuffering audiences by dilettante "projectionists" who are not only helpless when the simplest emergency arises, but are incapable of putting on a well-run show. The practice of projection demands considerably more than knowing how to trim a lamp, thread a reel of film, and make a changeover! Prints require intelligent inspection by *trained* eyes and handling by *trained* fingers: projection and accessory equipment demands *conscientious* maintenance and the *skilful* adjustment and repair of precision parts—and all this over and above running the actual show!

The bad effect upon the motion-picture industry of the part-time dabblers in projection is obvious. The movie-going public no longer tolerates dim, out-of-focus pictures, poor sound, misframes, ghosts, sloppy changeovers, and breakdowns. Film entertainment is degraded by bad projection, and the entire industry suffers.

The professional projectionist, in many cases a man who has devoted the greater part of a lifetime to the cultivation of his profession, is harmed the most by the low-paid dilettantes. He gets blamed for the sins of the incompetent, his profession is lowered in public estimation, his working conditions and living standards are undermined, and he exists in perpetual danger of dismissal and replacement by unqualified eager-beavers who look upon a projector as a pin-money machine which gives them the right to underprice the professionals.

Our attitude toward sincere aspirants to a position of responsibility in the projection profession has always been one of helpfulness and friendly encouragement; but we realize all too well that gifted young men with celluloid and arc dust in their blood are exceedingly rare. We older projectionists, successful and well established in our profession, should therefore examine long and critically, the native abilities, qualifications, motives, and intentions of instruction applicants. The theatre which is shuttered by the sloppy work of an unsuitable man in the projection room may be the one *in which we used to operate*.

R. A. M.

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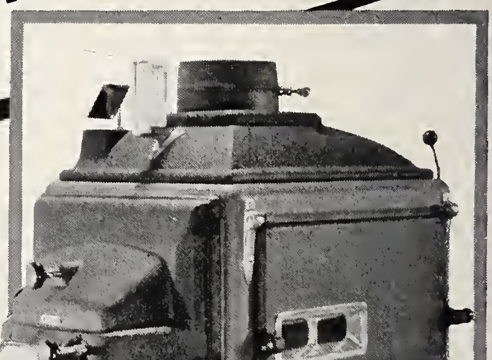

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*Automatic crater positioning system which maintains the tip of the burning carbon at the exact focal point of the reflector. Change of light color at the screen, caused by variation in carbon burning rates, is absolutely eliminated. *Rear lamphouse door which swings completely out of the way to facilitate retrimming and lamphouse and reflector cleaning. *Single adjustment controls the feeds of both carbons. *Simplified spot focusing. The entire burner assembly is movable so that the position of the arc can be shifted for the best screen light without disturbing the relative carbon positions or equilibrium of the arc.

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INTERNATIONAL PROJECTIONIST

Volume 32 OCTOBER 1957 Number 10

# The Care and Cleaning of Screens

By ROBERT A. MITCHELL

**With the recent emphasis on light and sound, the important factor of good screening may have been neglected; discussed here are some valuable pointers on proper screen maintenance.**

THE FUNCTION of motion-picture screens is twofold. (1) A screen provides a flat blank surface upon which the picture is projected, highly magnified and in sharp focus. (2) It transmits or reflects the light it receives into the viewing area occupied by the audience. The surface must be fine-grain and uniform, and it must reflect (or transmit) the maximum amount of light, distributing it evenly over the viewing area.

The overall, or integrated, reflective power of good screens is high. A matte or pearlized screen, for example, is dazzling white in color. Ordinary white paper reflects 50 or 60 per cent of the light falling upon it, but a perforated matte (white) screen of minimum acceptable quality reflects 70 per cent! In fact, a reflective power of from 80 to 85 per cent is usual for modern perforated matte screens, while solid, or non-perforated, screens reflect 90 per cent of the light or even a little more!

There are several distinctly different types of screens, as all projectionists know. The two main classes of screens are the *reflective* and the *transmissive*. Because transmissive screens require the projectors to be placed behind them, forming the projected picture by the transmission of light through the thin, translucent, semi-diffusing material of which they are made, such screens are used principally for rear-projection purposes in motion-picture and television studios. Transmissive screens are only seldom used in theatres, and appear unsuited to the wide-angle requirements of CinemaScope.

Conventional reflective screens, as their name implies, *reflect* the projected light to the eyes of the audience. They must do this with an absolute minimum of light-loss and distortion, and without altering the relative photographic densities of the light and dark areas constituting the picture. And in the case of color-film projection, the screen must not introduce color of its own by absorbing some colors more than others. In other words, a serviceable screen must be colorless or snow-white.

### Diffusive and Specular Screens

The class of reflective screens may be divided into two large groups, depending upon surface and light-reflecting characteristics. These are the *diffusive* and the *specular* types, with gradations between them. Diffusive reflective screens are known in the trade as "white," or "matte," screens; and because these screens have the best light-distributing properties and the finest, detail-revealing surfaces with the most uniform light-reflecting characteristics, they remain the universal standard for theatre projection. Only in the most recent times has a better type of screen appeared.

Specular, or directional, screens are represented by the "metalized" (aluminum-painted) and "beaded" types. Each of these, when correctly used, reflects most of the light directly into the audience area, but the reflection characteristics of the two are quite different.

A theatre screen subtends a large viewing angle, hence different parts of a screen are observed at different angles by each patron. If the screen is of the metalized type, some areas will look considerably brighter than other parts.

For observers in the middle of the auditorium, fadeaway at the sides of a flat high-gain aluminum screen will be excessive. Patrons in the balcony will see a picture brighter at the top than at the bottom. For patrons seated

at one side, as shown in Fig. 1, the picture will look annoyingly dark on the opposite side.

Aluminized screens should not be used in wide theatres or for wide-screen projection in any theatre.

Aluminized screens reflect mirror-wise, that is, at an angle equal to, but opposite, the angle of projection. Such screens work best where there is a moderate downward projection angle. They are unsuited to drive-ins where the projectors tilt upward. If used in drive-ins having steep upward projection angles, aluminum screens throw most of the light up into the sky!

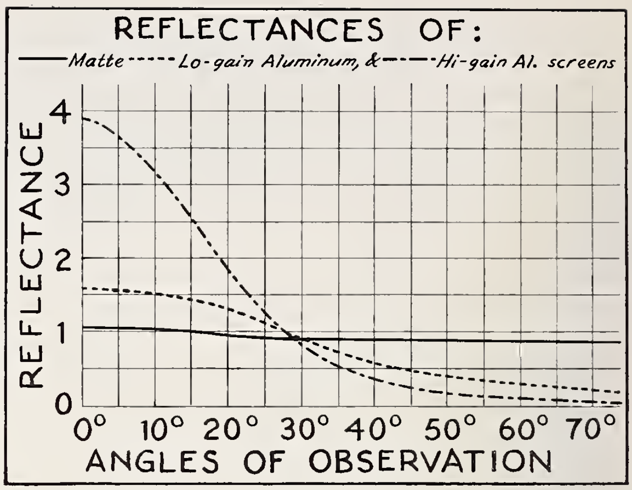



FIG. 3. Reflectance characteristics of perforated low- and high-gain aluminum screens contrasted with the performance of a good quality perforated white matte screen.

### *Beaded Screen Faults*

Beaded screens have reflection characteristics too "peaky" to make them satisfactory in theatres. Patrons in the middle of the auditorium see an excessively bright picture, while those

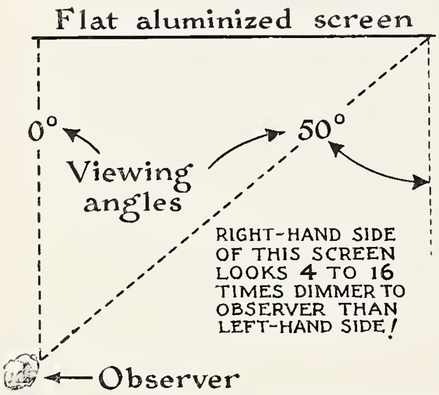



FIG. 1. Light deficiencies of the flat aluminized screen for the observer seated well to the side.

in the side seats are literally robbed of projection light. And unlike metalized screens, glass-bead and resin-grain screens reflect most of the light back toward the source—the projectors. This peculiar characteristic makes beaded screens unfit for use in theatres having steep projection angles.

Attempts to compensate for the directional errors of specular screens by physically tilting the screen are not approved. With the possible exception of specular screens in certain drive-ins, all theatre screens should be positioned plumb and parallel to the rows of seats (or to the *chords* of the rows when the rows are slightly curved).

Aluminum and beaded specular screens are often called "high-gain" screens because of the apparent reflectivity of these screens, when viewed from the center of the auditorium, is from 1½ to 5 times the maximum 100% reflectivity of a *theoretically perfect* diffusive screen.

Figure 2 illustrates the light-reflecting characteristics of *non-perforated* theoretically perfect screens. As shown, a perfectly reflecting and diffusing matte screen (dotted line) has at all viewing angles a reflectance of 1 (a reflectivity of 100%). The perfect specular or lenticular screen having a complete light-cutoff beyond 60 degrees (solid line) has a reflectance of 1.57 through a 120-degree viewing angle. The perfect directional screen cutting off beyond 40 degrees, funneling all light into an 80-degree reflectance angle, has a uniform reflectance of 2.2 (broken, or "dot-and-dashed," line).

Although perfect screens having these marvelous characteristics exist only in the imagination, modern screens of the matte, pearlized, and lenticular types approach these optimum performance characteristics and give brighter, clearer, more evenly lighted pictures than old-style screens.

Apparent reflectivities of 150%—500% are produced by directional properties which necessarily rob the side viewing areas of light. Light cannot be *created* by a screen; and the overall, or integrated, reflectivity of any screen never exceeds 100% (a reflectance of 1). Whereas a perforated matte screen furnishes an apparent reflectance of 0.80 to 0.85 at a viewing angle of 50 degrees, perforated aluminum screens have reflectances of only 0.2 to 0.4 at this angle.

Now, the severely directional characteristics of specular screens of extremely high gain absolutely preclude their use in wide theatres or in those having balconies or steep projection angles. Nevertheless, the polarized-light 3-D process works only with metal-surface screens, hence the widespread use of such screens in all shapes and sizes of theatre during 1953 and one or two subsequent years. But now that stereoscopic filming has fallen into the discard, obsolete aluminized screens should be used no longer.

Figure 3 diagrams the reflectance of perforated low- and high-gain aluminum screens contrasted with that of

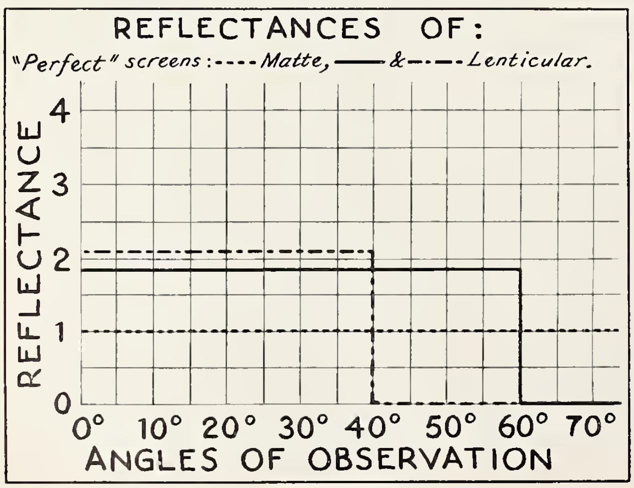



FIG. 2. The light-reflecting characteristics of theoretically perfect non-perforated screens.

a perforated white matte screen of good quality.

The "peaky" characteristics of the high-gain screen (3.9 reflectance at center. 0.2 at 50 degrees) precludes its use in any but the longest, narrowest theatres. The low-gain screen has a reflectance of 2.1 at the center and 0.4 at 50 degrees. Even this screen is too directional for widescreen projection.

Pictures projected upon aluminized screens sometimes look mottled, and they nearly always look grainy in highlight areas. This undesirable specular property of metalized screens, together with their low overall reflectance, induces quality-conscious theatre owners to select screens of other types for efficient and pictorially perfect projection.

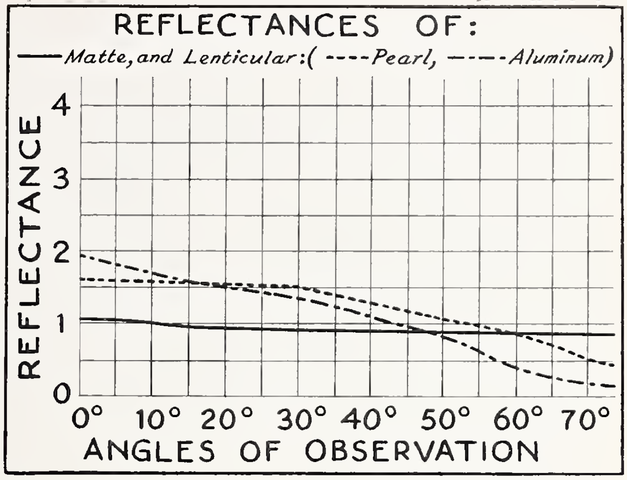



FIG. 5. Performances of perforated lenticular screens as compared with that of a perforated matte screen. The pearl stays brighter than the matte until after viewing angles of over 60 degrees.

### *Semi-Directional Screens*

Due to the technical ingenuity and deep appreciation of theatre-projection conditions by American screen manufacturers, however, new types of aluminized screens having improved light-distributing characteristics are now available. These more diffusive specular screens reflect light more uniformly over larger angles, and are suitable for use in theatres too wide for the old-style "peaky" aluminum screens. A distinction is thus made between high-gain and low gain metalized screens.

The new semi-directional aluminum screens lie midway in light-reflecting properties between the old strongly directional metalized screen and the white matte surfaces which are undeniably superior as regards the projection results they are capable of giving. Matte screens provide the highest degree of light distribution, a minimum of fadeaway, the best photographic resolution, and the truest color rendition. To find a better screen than a plain white screen, we must look to those marvels of modern screen engineering—the pearlized and lenticular types of screen.

Smooth pearlized screens are only slightly directional (center reflectance 1.5), and the reflection peak is broad. Even at the most extreme viewing angles, plain pearl screens are practically as bright as the best matte screens. So satisfactory are pearl screens in nearly every type of theatre, that we can confidently state that pearlized screen surfaces, both smooth and "lenticular," are the very best obtainable.

Presented in Fig. 4 are the reflectance curves of one unsatisfactory and two satisfactory types of screens. The beaded screen is much too "peaky" to be useful (4.3 reflectance at center, 0.45 at 50 degrees). This is shown by the "dot-dashed" line. Moreover, beaded screens often fog fine pictorial detail and may be irreparably damaged by cleaning.

The pearlized and matte perforated screens, on the other hand, have somewhat higher overall reflectances and more uniform surfaces which can stand repeated cleanings. The white matte screen, being almost perfectly diffusive, has practically the same apparent brightness at all viewing angles (0.85 reflectance shown by the solid line). The pearl screen, indicated by the dotted line, is only slightly directional. It has a reflectance of 1.5 at the center and 0.8 at 50 degrees. Pearl screens are somewhat superior to matte screens.

Both matte and pearlized screens give superb projection results and are highly recommended. Beaded screens, never satisfactory, are tabu in theatres having steep projection angles because they throw most of the light back in the direction from which it came.

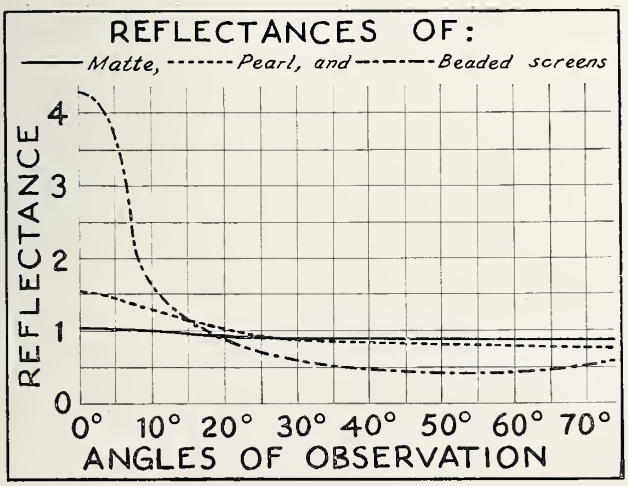



FIG. 4. Reflectance characteristics of one unsatisfactory and two satisfactory screens. Note that the beaded screen (dot-dash) is too "peaky."

### *Lenticular Screens*

The so-called *lenticular* screen is a newcomer to the group of screens intermediate between the specular and matte types. The light-distributing characteristics of lenticular screens are modified by tiny cuplike depressions, or lenticules, embossed into the plastic material of which these screens are commonly made. They are available in both pearl and aluminum surfaces; and, of the two, the pearl has the higher overall reflectance and the most uniform degree of reflection over wide viewing angles. The aluminum-surfaced lenticular screen, while definitely superior to plain aluminum screens, exhibits a reflection "peak" with a side-viewing fadeaway which becomes excessive beyond 55 degrees.

The light-distributing characteristics of pearl-lenticular screens, together with the high degree of definition and contrast imparted by them to the projected pictures, make them extremely desirable for projection of the highest quality in theatres of every type. They

combine all the good characteristics of matte screens with the exceptionally high and uniform reflection of light obtained by scientific screen engineering. It has been adequately demonstrated, by test and by actual theatre use, that pearl-lenticular screens are superior to all other types of screen.

Perforated pearl-lenticular screens have a center reflectance of about 1.6 with no appreciable falloff up to 30 degrees. Reflectance is 1.1 at a 50-degree viewing angle, 1.0 at 55 degrees, and 0.8 at 60 degrees. Good modern matte screens have a center reflectance of 1 with a falloff to 0.9 at 30 degrees, and to 0.8 at 70 degrees.

Reflectances at various viewing angles of perforated *lenticular* screens are shown in Figure 5, the dotted line indicating the pearlized, and the dot-dashed line, the aluminized, screen. The reflectance curve of a perforated matte screen (solid line) is included for comparison.

These curves indicate that both types of lenticular screen give a brighter picture than the matte screen over the main angles of viewing. The pearl-lenticular screen, however, provides uniform brightness from the center to an angle of 30 or 35 degrees (reflectance of 1.6), whereas the aluminum-lenticular screen, having a center reflectance of nearly 2, decreases in brightness to the level of the pearl-lenticular screen (1.6) at 12 degrees, and to the level of the matte screen (0.85) at 48 degrees. The pearl-lenticular screen does not become less bright than the matte except at angles greater than 60 degrees.

In the opinion of this writer, the pearlized lenticular screen, a comparatively recent development, represents the best type of screen surface available for theatre use. It gives a beautiful picture and is unexcelled for widescreen projection in auditoriums of all shapes and sizes, and regardless of the prevailing projection angle.

### Curved Screens Tabu

A good screen suited to the shape and size of the auditorium and to the prevailing projection angle is a prime consideration in any theatre. The screen should be regarded as a principal component of the projection system, and not as a mere incidental. "Any old sheet" will not do, for even the best projectors, lamps, and lenses are wasted upon an unsuitable or imperfect screen!

Our recommendations have been made clear. Beaded screens are not favored at the present time; neither are the old coarse-textured, extremely high-gain aluminum screens which look spotty and grainy, and produce fadeaway at the bottom of the picture when viewed from the balcony, or fadeaway at one side when viewed from the opposite side. The use of low- and medium-gain aluminum screens of modern manufacture should be confined to long, narrow theatres. The lenticulated aluminum screen is perhaps the most satisfactory metalized screen.

Which screens, because of their excellent performance, are favored? The white matte screen is standard and gives results which, for color rendition and for clarity and contrast of image, can be equalled only by more modern screens of special types, notably the pearl and lenticulated pearl. The pearlized screens give the same beautiful picture that a matte screen does, but provide greater brilliance to make the picture more vivid, more lifelike. The plain pearlized screen, therefore, is somewhat superior to the matte screen, while the pearl-lenticular screen is by far the best screen of all.

Curved screens should not be used because they distort the geometry of the picture, especially where moderate to steep projection angles exist. Special processes such as Cinerama, Todd-AO (70-mm film), Thrillarama, Cinemiracle, etc. employ curved screens to suggest a "surrounding" of the audience by a panoramic field of view and to maintain the same projection distance at all points on the extra-wide screens. Screen curvature is justified in these special processes because, as a rule, steep projection angles are avoided and because of the "novelty" quality of the projection. Standard projection even at the higher aspect ratios does not, and should not, duplicate special conditions which, however spectacular and interesting, are clearly unsuited to the main function of the theatrical motion picture, *i.e.* the telling of a story. Projection invariably seems below par in theatres having curved screens.

### Causes of Screen Deterioration

If the selection and correct installation of a suitable screen is the first step in insuring good results from the projectors, lenses, and lamps, then proper maintenance of the screen is the next most important expedient.

Screens are certain to become dirty with the passage of time; and the screens in some theatres get dirtier faster than those in other theatres. The air in industrial and downtown locations is very much smokier and dustier than the air in suburban areas. Smoking in the theatre, although a necessary comfort to patrons, causes screens to become yellowish very quickly. Airborne grime and tar particles unavoidably settle upon the surfaces of screens, darkening and discoloring them. The use of screen paints containing white lead is another factor in the deterioration of screens. Lead-containing pigments are not used in modern screen paints, for they gradually turn brown when exposed to the volatile sulfur compounds unavoidably present in town air.

Screens should be replaced when they become extremely dirty, although modern plastic screens may be washed repeatedly and certain older screens may be repainted. It is truly astonishing how many theatre owners tolerate old tar-yellowed, dirt-streaked screens which reflect scarcely more than 50% of the light projected upon them!

Old-style matte screens were ordinarily made of canvas coated with a

(*Continued on page* 26)

### A Boost from the Swiss

Dear Sirs:

**I got the July and August issues of IP. Thank you very much. It's really a very interesting magazine, much better and more interesting than the German magazine I had before. Unfortunately, we don't have something like that here in Switzerland, and one has to read the German magazine if one cannot understand a foreign language. But since I have the intention of emigrating to the United States, "International Projectionist" can give me some helpful information about conditions in the USA.**

**I would be very grateful if you could send me IP in a better wrapping, since I'll bind the copies. The last two copies I got in a bad state. I hope I have not caused you too much trouble in this connection, and send you my best regards.**

Yours faithfully,
HANS P. VERZERI

Lucerne, Switzerland

(ED. NOTE: We are appreciative, and we always try to oblige. But to all its readers both here and abroad, IP may only say that if your copy arrives somewhat mauled, it went from here in good shape.)

**Increased demands for more and more light, and inefficient operation indicate a necessity for some kind of work-guide.**

# Factors in Choice of Proper Lamp and Carbon Trim


**By JOSEPH HOLT**

Member, IA Local 428, Stockton, Calif.


CHANGES HAVE COME so fast during the past few years that few practitioners in the field of projection have had the time to pause for a deliberate look at current practice. This is particularly true in the matter of the choice of lamp and carbon trim used by the theatre with its spiraling demands for more and more light on the screen.

It is probably true that some theatres are spending money uselessly for light which could be obtained at less cost and greater stability of operation. It is more likely, however, that most theatres are suffering from inadequate lighting and have not discovered that the light needed can be obtained by close attention to the principles we propose to discuss herein.

### *Lamp and Carbon Trim Efficiencies*

One of the first items of knowledge which will be of value is to explore the efficiencies of various trims and lamps. Reference is to Fig. 1, which depicts the graphical relation of lumens output versus electrical watts input. The numbers under each bar identify each trim and optical aperture as follows: Bar 1 indicates the lumens-to-watt factor for a 6-mm by 9-inch negative and 7-mm by 14-inch positive burning at 40 amperes in a lamp with a speed of *f*:2.5.

Bar 2 is for a 7-mm at 50 amperes operating at *f*:2.3; Bar 3 is an 8-mm carbon at 70 amperes through *f*:2.3; Bar 4 is a 9-mm carbon at 75 amperes through *f*:2.3. All the foregoing concern copper-coated carbons of the "Suprex" type.

Bar 5 illustrates the luminant efficiency of the 9-mm carbon operating at 85 amperes through an optical system of *f*:1.9 speed; Bar 6 is a 10-mm at 100 amperes and *f*:1.9: Bar 7 is a 13.6-mm at 160 amperes and *f*:2.0, and Bar 8 sets forth the efficiency of a trim such as the National Hitex 13.6 at 170 amperes in a lamp designed for *f*:1.4.

### *Necessary Fast Lenses*

The efficiencies given in Fig. 1 are computed on the basis of the use of *f*:2.0 projection lenses throughout, for the simple reason that comparison figures must not deviate if they are to be truly impartial. The reader will recognize that figures given may be increased significantly in the case of the *f*:1.9 and *f*:1.4 lamps by the use of the new *f*:1.7 lenses. In fact, use of the faster lenses is an absolute necessity in order to raise the higher-power lamps to impressive efficiency figures.

The reader's attention is directed to the close contest between the 8-mm trim at 70 amperes and the 9-mm trim at 75 amperes. The 8-mm trim will produce almost 95 per cent as much light as the 9-mm. with 17 per cent input power. For the intermediate size theatre. this saving is important and should be considered, especially since the most popular lamp in which this trim is burned will waste large amounts of light due to the larger spot available at the aperture from the use of the 9-mm carbon.

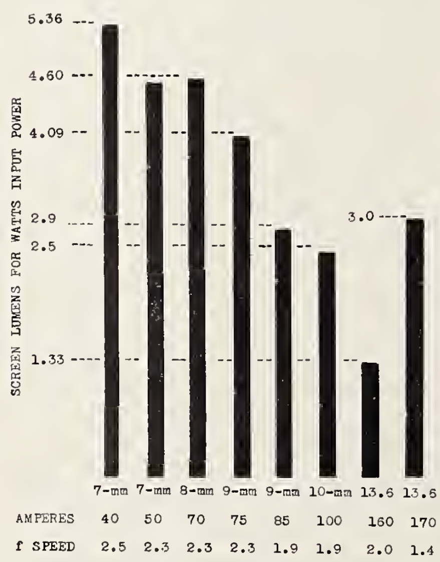



**FIGURE 1.**

Another point which should receive attention is the fact that HI trims of the uncoated variety require tremendously larger power inputs over the "Suprex" trims, and in lamps of the older design with the *f*:1.9 mirror speeds, do not equal the output of the "Suprex" trim until power inputs are increased by about 15 per cent.

In terms of screen light, then, we have seen that higher-powered arcs do not attain the astounding efficiency of the tiny "one-kilowatt" arc, and this finding alone would seem to dictate that if relative efficiency is all we are interested in, we should at once replace all lamps with the one-kilowatt sources.

Unfortunately, the projectionist is faced with exacting demands for more total light, and for this reason must look at the light-delivering ability of each lamp and carbon before adopting it.

### *Need for a Guide*

It would be useful if we could derive some guide as to what might be expected of the various trims. Projectionists know all too well that the wide-screen apertures with a vertical dimension less than .600 inches reduce total light drastically, while apertures with vertical dimensions up to 1.06 inches will permit significant increases in transmitted light.

On the basis of the old 1.33 aspect ratio aperture (.825 inches by .600 inches), we should choose a lamp and trim which will produce acceptable light on the screen we plan to use.

The reader is referred to other material in print in which the factors governing the type of screen to be used are explained. For the present discussion, however, it should be enough to say that except in the very widest theatres where lateral viewing angles exceed 30 degrees from the screen center line, the high reflectivity or gain type screen is indubitably the preferred type, if mounted on a radius equal to projection distance.

The gain figure selected for use in these computations is the median of 2.4, which may vary from one screen manufacturer to another.

We proceed by taking into account


Because beauty is skin-deep...
Skin tones must be precise—from original negative through final release prints. This means care in the selection of film, care with processing, rigid controls—keyed to each specific problem. In this area, as in all phases of production, distribution and exhibition—representatives of the Eastman Technical Service for Motion Picture Film are proud to serve the industry. Offices at strategic centers.
Motion Picture Film Department
EASTMAN KODAK COMPANY
Rochester 4, N. Y.
East Coast Division
342 Madison Avenue
New York 17, N. Y.
Midwest Division
130 E. Randolph Drive
Chicago 1, Ill.
West Coast Division
6706 Santa Monica Blvd.
Los Angeles 38, Calif.

the reduction in total light on the screen due to the shutter and other losses. We propose to use the figure of 55 per cent loss in this area. Beginning with the total lumen figure of 5900, we multiply by .45, and obtain the product of 2660. If we now divide the product number by 12, our own arbitrary level for foot-lambert (within the standard of 9 to 14 foot-lamberts), we come up with the size of 222 if the screen surface has a reflectance of unity. Since we may use a gain screen with a reflectivity of 2.4, we can state that 530 feet can be adequately lighted. But if we must use a matte screen with an assumed reflectance of .7, then we can light only 155 square feet! Using the same sort of thumb rule, we may now examine some of our other trims and lamp speeds.

### *Applications of Formula*

For the 7-mm at 50 amperes with a lamp speed of $f$:2.3, we may expect good results with a reflective screen of 830 square feet, or a matte screen of 242 square feet.

With an 8-mm at 70 amperes and $f$:2.3, we can light 1170 square feet of gain screen, or 342 square feet of non-directional surface.

The 9-mm trim operating at 75 amperes and $f$:2.3 will enable us to cover only 1248 square feet of reflective screen and 374 square feet of matte screen.

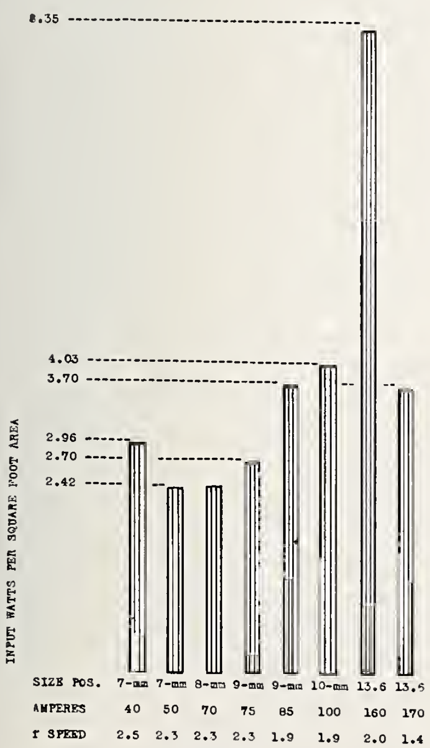



**FIGURE 2.**

Increasing amperage to 85 amperes with the uncoated trim such as the National HI on a 9-mm at $f$:1.9 will make it possible for us to light 1320 square feet of gain surface or 382 square feet of matte screen.

100 amperes with a 10-mm at $f$:1.9 will do a good job on 1395 square feet of gain screen, but only 406 square feet of non-directional screen. Big differences show, however, in the performance of the 13.6-mm trim in the newer lamps. At $f$:2.0, such a trim at 160 amperes will light 1485 square feet of gain screen; with a lamp speed of $f$:1.4 and a projection lens of $f$:2.0, the acceptable area rises to 1890 square feet: but with a projection lens of 1.6, it becomes possible to cover 3205 square feet! For non-directional screens, the comparable areas are respectively 434, 550, and 935 square feet. Thus we forcibly have demonstrated the value of the faster optics available in lamps and projection lenses.

Figure 2 indicates the relation of input watts to square feet of screen area lighted at the value we have set. It also depicts the overall efficiency of lamp, arc itself, and effective aperture of the entire system. In conjunction with Fig. 1, the data given will aid in the choice of the proper lamp and trim for each particular theatre.

## IP LETTERS TO THE EDITOR

### More on "Film Standards"

*To the Editor of IP:*

Your article, "Film Standards for Picture and Sound," by Robert A. Mitchell was good reading; I would not question Mr. Mitchell's expertness in his field.

However, I feel that in this article Mr. Mitchell has pre-judged without seeing. He makes the statement that Technirama has no depth of field, and gives blurrier backgrounds in closeups and medium shots. I saw "Night Passage" in New York City, and for my money, Technirama has the greatest depth and clearness of any system I have ever viewed—with the exception of 3-D. I note that Mr. Howard Cricks in "From the British Viewpoint" also feels the same as I.

I fail to understand why Mr. Mitchell, with his vast experience in this field, should come out with such a statement. Surely the picture "Night Passage" contradicts his findings.

Thomas F. Lyons

Brooklyn, N. Y.

Mitchell's Reply: This writer is as impressed with the excellence of the Technirama process, used in the photography of "Night Passage," as Mr. Lyons seems to be. Simultaneous sharpness of foreground and background detail in Technirama is produced by the old, old trick of reduced lens speed, an expedient frequently used for many years in conventional cinematography. In order to partially compensate for the reduced negative exposure which would otherwise result, the shutter openings in the Technirama camera are unusually wide. It may be presumed that the resulting blur of objects in rapid motion would render stills from Technirama negatives less usable than those obtained from standard movie cameras.

Highly refined anamorphic attachments, one to provide partial compression of the image in the camera, and another to complete the compression during printing, are responsible for the high degree of clarity across the entire width of the picture. Overall resolution noticeably exceeds that of CinemaScope, but target tests reveal no improvement over horizontal VistaVision.

The optical principles involved in depth-of-field problems are well known; and with camera lenses of corresponding focal lengths and similar optical speeds, it is found that normal-frame 35-mm photography has appreciably better depth-of-field characteristics than CinemaScope, VistaVision, or Technirama. But Technirama, we have seen, is tailored for stopped-down lenses (which may also be used with any other type of camera).

The depth and clearness of 3-D, mentioned by Mr. Lyons, is precisely identical with that of the conventional movies which the public has viewed over a 50-year period. No special film, no special lenses, and no particular extra care in camera focusing were used. If anything, Hollywood geniuses violated every principle of stereoscopic photography and produced 3-D films which looked better when shown in the usual 2-D way.

Mr. Lyons should bear in mind that the Technirama method is an attempt to *approach*, and not necessarily to *surpass*, the same high degree of image definition which characterized the best standard 35-mm cinematography in the days before wide screens. That the Technirama films made to date actually do surpass the clarity of the *average* standard-frame film bespeaks the consummate skill and infinite pains exercised by the Technicolor Corporation in the development and application of their new process.

**Recent industry innovations have necessitated a major replacement program for the U.S. Motion Picture Service.**

# Selection of Replacement Equipment In Army and Air Force Theatres†

**By W. D. SHEPARD**

THE ARMY AND AIR FORCE Motion Picture Service is an agency of the Department of Defense, supervising the operation of entertainment motion-picture theaters on Army and Air Force installations and procuring motion picture programs and motion picture equipment and supplies required in connection with the operation of those theaters. The AAFMPS is administered under generally accepted business principles. It provides entertainment and facilities of sufficiently good quality to encourage the soldiers and airmen to remain on the installation rather than seek less wholesome entertainment elsewhere. It is therefore imperative that the AAFMPS maintain its equipment to assure high-quality picture exhibition and sound reproduction.

The equipment - replacement policy is not based on any fixed depreciation rate. It is determined by the actual rate of physical deterioration or its obsolescence in the light of new developments of sufficient importance to render a change either necessary or very desirable in the interest of better service to the military personnel. Basically, every replacement must pay for itself either in dollars or in definitely improved results. Such a policy is flexible and can be described in terms of past replacements and existing future plans; but it cannot be reduced to any simple formula.

The equipment - replacement program that will now be described began as soon as it became apparent that at least some of the new techniques were permanent additions to the art and had box-office value. The program was planned as early and as carefully as the changing standards permitted, and in such a manner that no future development would be likely to render obsolete or inadvisable any previous step. It was necessarily spread over a sufficiently long period of time to permit its accomplishment with no increase in personnel. As a result, no reversal of policy was necessary at any time and no investment has failed to achieve its potential value.

It is appropriate to point out here that in the opinion of the Engineering Depot of the Service there is no best product or best type of product for all purposes. What is chosen for use in Army and Air Force theatres is that which is deemed best or fully satisfactory and most economical for the specific set of conditions under which it is to be used. The conditions of military operation may differ in many ways from those in most civilian houses. Actually, a considerable variety of type of equipment and the products of many manufacturers are in use.

### *Service Criterions*

Before buying any product, samples are inspected from the standpoint of construction and probable service problems, after which they may be subjected to appropriate tests. Screens are measured for gain, the polar diagram of light distribution is determined, and the surface is checked for durability. Lenses are tested for resolving power and aberration by means of targets, as well as by direct observation of projection. Amplifiers are tested for frequency response, output and distortion. Soundheads are subjected to flutter measurement.

With the appearance of the new wide-screen techniques, it became apparent that drastic changes would have to be made in the method of presentation. Image size had been based on existing industry practice, generally from one-fifth to one-sixth of the maximum viewing distance. Civilian theatres were installing larger and larger screens, the size often limited only by the proscenium arch. But it appeared that images could be made too large.

In some theatres, at least, the audience seemed to prefer the back rows. Perhaps there is no fixed maximum, but there undoubtedly is a degree of magnification that is too great for the quality of average film or lenses, or the steadiness of ordinary projectors, and it may well be that too large an image may at times appear inappropriate for some subject matter.

After some study, it was decided that a CinemaScope image of a width approximately one-third of the maximum viewing distance would generally be a satisfactory compromise. Smaller images would not be strikingly larger than those previously in use, and much larger ones seemed to present as many disadvantages as advantages. As it happened, architectural factors also were favorable to this proportion in most of the standard buildings. This decision with regard to image meant that there would be little change in image height. Obviously, any reduction would have had an unfavorable effect.

It was decided at this time that CinemaScope images would not be cropped or squeezed. It appeared not unreasonable that the specialists at the studios would have a better idea of what was to be portrayed and of requirements of composition than a projectionist or manager armed with an array of aperture plates.

In rare cases, where screen width was severely limited by building construction and where a 2.35/1 aspect ratio would have resulted in a marked reduction in height, the image was cropped laterally by 5 per cent and a 5 per cent squeeze was introduced by means of a variable anamorphic lens. Although these small amounts are

† SMPTE Journal, May 1957

hardly detectable, this procedure was considered only the lesser of two evils and definitely to be avoided whenever possible.

It next became necessary to determine the image size and proportions for non-anamorphic projection. Different aspect ratios were recommended by different studios. It was realized that frequent changes in picture size, as dictated by the quality and photographic composition of each individual film, would lend interests or have publicity value in the civilian fields, but this was not considered either necessary or desirable for military theatres.

### 1.66 Aspect Ratio

A survey of the product originally available showed that most of it had been photographed for the standard 1.37/1 aspect ratio, that it would usually be projected satisfactorily at 1.66, but that it frequently suffered at higher ratios.

If experienced civilian projectionists sometimes had difficulty in framing up and down for satisfactory projection of close-ups, there seemed little likelihood that the enlisted projectionist would do better. The 1.66 aspect ratio was chosen, therefore, and the height was matched to that of the CinemaScope image. Early plans provided for a possible change to larger images for some pictures, but this has not proved to be either necessary or, in view of the operating complications, desirable.

Probably as much misinformation has been circulated on the subject of screen curvature as on any other recent development. The problem, of course, is to determine what radius of curvature will provide the most uniform brightness over the greatest possible part of the seating area, or to decide whether the disadvantages of curvature might be seriously objectionable in any particular case.

Because vertical viewing angles were small and very few of the theatres involved had projection angles exceeding about 5°, the problem of the apparent curvature of horizontal lines was virtually nonexistent. Since it was not necessary to fly the screens in crowded fly lofts, there was no other pressing reason for using a flat frame. Finally, because of the small projection and viewing angles, tilting of the screen to direct maximum reflection into the seating area proved to be unnecessary.

All that was necessary was a relatively simple drawing-board study of a few representative types of auditoriums. For this purpose, a few viewing positions were chosen: at the sides at front, center and back. The angle between the line of sight and a specularly reflected ray provides the means of reading, from the polar diagram of screen reflection, the relative brightness of that point of the image. By proper choice of curvature, the brightness of the near and far sides can be equalized. In practice, this calls for compromise in the interest of the best overall condition in the preferred seating areas.

As a consequence of this study, curved frames were installed in by far the greater number of theatres. Where very small images were used, flat white screens could be illuminated satisfactorily, and were provided. In those cases where curved screens were not desirable and where the images were large, lenticulated screens were installed. Their more uniform light dis-

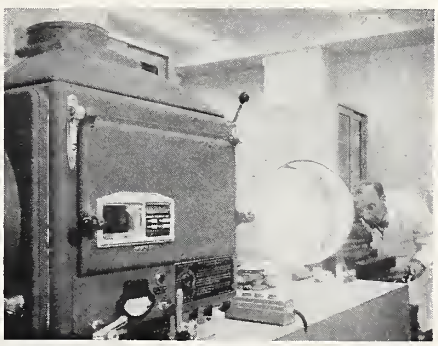
(*Continued on page 34*)

## Projection Mirrors Duplicate Sun's Heat

Scientists probing the mysteries of intense heat have produced temperatures approching that of the sun's surface with ordinary motion picture projection equipment, it was recently disclosed. Highly-polished curved mirrors concentrate rays from a carbon arc into a small but extremely high-energy beam that can produce temperatures above 7,000 degrees Fahrenheit. The technique is actually a scientific version of the use of a magnifying glass to set fire to a piece of paper, and was developed in connection with high-temperature studies at the research laboratories of National Carbon Company, Division of Union Carbide Corporation.

"The arc image furnace, as this versatile research tool is known, is not new," explained Dr. R. G. Breckenridge, director of the laboratories, "but an entirely new twist has been introduced that adds immensely to its usefulness and makes practical the high temperatures required in modern-day research. Previous furnaces have used specially-designed parabolic mirrors to focus the arc's energy onto the substance to be heated.

"Our new design uses two elliptical mirrors of the standard type found in motion picture projection equipment. One mirror directs the energy of the arc at the other, which in turn concentrates the radiation on the specimen being heated, forming a life-size image of the actual arc."



Shown here is a technician using a high-temperature microscope to see what is happening as a material under study is heated to extremely high temperatures by the arc image furnace, which is an extremely versatile research tool.

The new equipment is highly compact and portable and can be operated practically anywhere, at any time. It is said to produce results comparable to that of a solar furnace with a 60-inch diameter reflector, which depends on the sun's rays for its energy and can be operated only under favorable climatic conditions.

### Uses Half-Inch Carbons

The arc image furnace now in use here uses arc carbons less than one-half inch in diameter, focused by mirrors approximately 18 inches in diameter and placed about 6 feet apart. The arc draws a current of 200 amperes, which is approximately twice the electrical requirement of a modern home. Normal operating voltage is 80 volts. There is no reason why the arc image furnace cannot be extended to larger arcs with higher power to heat larger samples, and work along these lines is already underway.

In addition to its use of standard equipment, the new system has the advantages of providing a narrow beam midway between the two mirrors where a shutter can be placed to turn the energy on and off very quickly without disturbing the arc. A tilted mirror can be placed at the same point to tip the beam at any desired angle if it is to be used in melting a specimen.

"As an extremely 'clean' source of high temperatures, the arc image furnace is ideally suited to metallurgical research where purity is particularly important," Dr. Breckenridge explained. "The beam can be projected through a transparent window into an enclosed vessel in which the atmosphere can be controlled, and which can even be raised to high pressures if a combination of high temperature and pressure is desired. Because of these features, it is a very valuable research tool, and might well become a useful production tool in the future as high temperature operations become more common in industry."

The function of this department is to provide a forum for the exchange of news and views relative to individual and group activities by members of the organized projectionist craft and its affiliates. Contributions relative to technical and social phases of craft activity are invited.

# *In The* SPOTLIGHT

THE 25-30 Club of Greater New York opened its first seasonal meeting on September 12 with a testimonial dinner in honor of Clarence and Mary Ashcraft of the C. S. Ashcraft Mfg. Co. The affair was held at the famous Cavanaugh Restaurant in New York City, and by unanimous agreement it was one of the Club's most successful testimonial dinners.

On hand to greet the lamp manufacturer were a host of dignitaries including Eugene Picker, vice-president of Loew's, Inc.; Arthur Meyer, vice-president of International Projector; Allan G. Smith, manager, N. Y. C. branch, National Theatre Supply Co.; Lester Isaac, national director of exhibition for Cinerama; John Kohler, supervisor of projection for Loew's, Inc.; Willy Borberg, design engineer for General Precision Laboratory; Paul Ries, National Carbon; Robert Solomon, manager, N. Y.'s Victoria Theatre, Edward Lachman, Lorraine Carbons, and Bart Greene, supervising chief inspector for the N. Y. C. Department of Water Supply, Gas and Electricity. As usual, Nat Doragoff, the Club president, presided, and Morris J. Rotker did the m. c. chores.

A series of testimonial speeches went well through the evening and many a visiting celeb was introduced. Space doesn't permit us to mention all of them but among the many were tribute speeches from Lester Isaac, Bart Greene, and Jack Rollman, chief projectionist at the Rivoli Theatre in New York, where Ashcraft lamps are currently lighting up Mike Todd's "Around the World in 80 Days."

One bit of information that piqued the interest of the diners was the statement by Bart Greene that in his 45 years of experience with the department of water supply, gas, and electricity, there had never been a fatal accident in a motion picture theatre projection room.

An amusing off-the-cuff personal account was given by guest of honor Ashcraft, who understandably was appreciative of the splendid turnout for him. Also representing the Ashcraft organization were Albert Johns, Lawrence Orthner, and William Turnbull—plus a brand-new Super Cinex lamp mounted on the stage.

Many chief projectionists were on hand to honor the Ashcrafts—Ben Olevsky, Radio City Music Hall; Charles Talley, Roxy Theatre; Gio Gagliardi, Stanley Warner Theatres; and Milton Berkowitz of the Capitol Theatre. Also present were Ralph Kautzky, regional manager for Altec Service Co.; and Barry Passman and Harry DeFura, of International Projector. Among those representing New Jersey 1A Locals were Ralph DeMea, Tony Boscarelli, Arthur Mebbs, and Jim Mullen, of Local 384, Hudson County; Harry Shockett and John Lawson, Local 244, Essex County.

The end of this column is coming up rapidly, so our conglomerate salutation to all the other 25-30 Club luminaries, including Morris J. Rotker, past president of the Club, and Morris I. Klapholz, Club secretary, who was recently elected an honorary member of England's NATKE.

This department extends its felicitations to the Ashcrafts and the 25-30 Club . . . the roast beef and trimmings were excellent, thank you.

• Speaking of office-holding records, one must look far and wide to beat that held by that perennial office-holder, James A. Whitebone, secretary and business representative for the past 35 years of Local 440, St. John, N. B. His recent re-election to the presidency of the New Brunswick Federation of Labor, a post he has held since 1930, and his long term of office in the St. John Trades and Labor Council (almost consistently since 1926), plus his varied interests in world wide labor movements, spell a lifetime of devotion to promoting the welfare of the working man and his family.

• Of special interest to photographic hobbyists is the 22nd annual show of the Rochester International Salon of Photography which will open on March 1, 1958 at the Memorial Art Gallery in Rochester, N. Y. Entries will be classified in five sections: Pictorial Color Slides, Pictorial Prints, Nature Prints, Nature Color Slides, and Stereo Color Slides. All photographs must be submitted no later than February 9, 1958. The Salon will award 18 medals for the best entries. Data and entry forms are available from Mr. Norton Brownell, 298 Lettington Drive, Rochester 11, N. Y.

• An agreement reached between Local 225, Atlanta, Ga., and the management of the Madison and Kirkwood Theatres ended a one-day walkout by the projec-

### ASHCRAFT SUPER CINEX IN SPOTLIGHT AT 25-30 CLUB PARTY

Front row, left to right: Julius Wetzler, trustee 25-30 Club; Wm. Anderson, Club vice-president; John Rollman, chief projectionist, Rivoli Theatre; Clarence Ashcraft; Mary Ashcraft; Nat Doragoff, 25-30 Club president; Morris J. Rotker, past president, 25-30 Club; Dave Garden, and Alex Borgman. Rear, left to right: Tony Rugino; William Saulkey; John Kohler, projection supervisor, Loew's, Inc.; Harry Mackler; and Phil Glazier.

tionists. Jacob Pries. business representative for the Local. stated that the projectionists had been getting $1.70 per hour. per man. plus a few fringe benefits. and at the regular monthly meeting the men voted to strike unless they got an increase of $5.00 per week. Pries said that a "very satisfactory" agreement had been reached with Earl Hathcock. owner of these two neighborhood houses.

The projectionists returned to work in five other struck houses pending new contract negotiations.

• Lou Walters, member of Dallas Local 249 and occasional contributor to the editorial pages of IP. operates a projector repair shop in addition to holding down a job as projectionist at one of the local drive-in theatres. In connection with his repair shop, Walters recently sent notices to projectionists and exhibitors stressing the importance of using narrow-tooth sprockets with the new mag-optical prints. He claims that his method of grinding wide-tooth sprockets to narrow-tooth size will not damage the film.

• A new contract calling for two stagehands ended the two-month strike of Stagehands Local 138, Springfield, Ill., against the management of the Orpheum Theatre there. The theatre was struck several months ago when the management demanded that the Local reduce the number of stagehands from two to one. With the signing of the two-year pact. the theatre re-opened with the feature "The Ten Commandments." Sam Bonansinga, business representative, was in charge of negotiations for the Local.

• Although Pittsburgh Local 171 was rendered a favorable decision in its suit last year against the owner of the Grant Theatre in Millvale, Penna. (which is in the Local's jurisdiction) for nonpayment of health and welfare benefits as stipulated in a three-year contract, the judgment has not yet been paid. The exhibitor's recent petition before the referee in bankruptcy in which he proposed a plan whereby he could meet the claims of his creditors was found unsatisfactory. and he was adjudicated bankrupt. A trustee will be named by the referee and all assets belonging to the bankrupt will be liquidated to meet the justified claims of Local 171 and other creditors.

## MEMBERS AND GUESTS AT 25-30 CLUB TESTIMONIAL DINNER

Seated around the table, clockwise: Tony Boscarelli, past president, 25-30 Club; J. Wetzler, Joe Perlman, and Nat Strauss, Club trustees; Chas. F. Eichhorn; Edgar Stewart; Joe Abrams, and H. Mackler. Far right: Chief projectionists Chas. Talley, Roxy Theatre; Milton Berkowitz, Capitol Theatre.

Seated, left to right: Dion De Tita; Ralph DeMea, Arthur Mobbs, Jim Mullen (latter three members of Local 384, Hudson Co., N. J.); IP's Robert MacLeod; and Lester B. Isaac, Nat'l Director of Exhibition, Cinerama.

Left to right: Eugene Picker, vice-president, Loew's, Inc.; Abe Kessler, past president, 25-30 Club; Robert Solomon, manager, Loew's 125th St. Theatre, N. Y. C.; Morris Rotker, master of ceremonies; Allan G. Smith, manager, National Theatre Supply branch, N. Y. C. Standing: Mackler, Morris I. Klapholz, Club secretary; Robert Goldblatt, president of the first projectionists' union in greater N. Y. C.

## SMPTE Sponsors Courses for Technicians

SMPTE has again sponsored courses for technicians, two in New York, and one in Los Angeles. At New York University, the subcommittee for Education of Sound Technicians along with Motion Picture Studio Mechanics Local 52. IATSE. has established a Laboratory Practice course moderated by Ralph D. Whitmore. There is also a course, the only one of its kind, in basic electronics designed especially for sound technicians: "Electrical Principles for Motion Picture Sound Recording," conducted by George Christ. supervision engineer of the New York Telephone Co.

At UCLA, Edward E. Benham, chief engineer of Station KTTV, Los Angeles. heads a subcommittee sponsoring an extracurricular course in the use and handling of film in TV. Ralph Westfall, motion picture engineer of the West Coast division of motion picture film distribution for Eastman Kodak, is coordinator.

The course has been developed to assist those in the TV industry who are responsible for the general handling and maintenance of film, and the procedural techniques involved in the use of films in TV stations. Experts from the motion-picture and TV industries will discuss everything the station film user needs to know about picture and sound on film, recording and projection and the related equipment, in order to do a better job.

These courses are not opened to the general public, but only to applicants actively engaged in motion pictures or TV.

## BIS Back in Business

British Information Services has announced that their theatrical and non-theatrical film services which were withdrawn last June for reasons of economy have been replaced. Contemporary Films, Inc., of New York City has been appointed official distributor for all 16-mm prints of BIS films.

# News and Views from District No. 2

**By HANK BOLDIZSAR**

**Member, IA Local 150, Los Angeles, Calif.**

THIS MONTH'S report on West Coast activities is being written by yours truly from the family campsite along the shores of beautiful Clear Lake, situated about 150 miles north of San Francisco. Just before taking off for this ideal vacation spot for a week of swimming and fishing with the family, I attended the District No. 2 Council meeting, which was held at the Flame Restaurant in San Diego, Calif. This was a perfect situation since our Council president is the very genial Billy Wise, business representative for San Diego Local 297, the host Local. During the premeeting social hour Lou Alberts, press secretary for 297, introduced yours truly to the officers and delegates representing the various IA Locals of that area.

With the seating of the delegates, President Wise called the meeting to order and then proceeded with the roll call and the introduction of guests. Among the invited guests were Carl Cooper, IA 2nd vice-president, and George Flaherty, special IA representative.

### *Locals Report on Activities*

Business of the day opened with a report by Council secretary Lon Bennett of Long Beach Local 521 regarding the confinement of Tom Doherty, Local 415, Tucson, Ariz., to the Veterans Hospital in Los Angeles. The delegates voted to send Doherty the usual items of good cheer to help brighten his stay at the hospital.

George Schaffer, business representative for Los Angeles Local 150, reported that contract negotiations with the Fox West Coast Theatres were still pending. The stumbling block seemed to be the new equipment clauses with scale increases for the suburban houses equal to the override now being received in the first-run houses. The assistance of IA President Walsh has been requested. (The override for first-run houses running special process film is 66 cents per hour over basic scale for the house.)

Schaeffer also informed the delegates that the world-famous Grauman's Chinese Theatre is being considered for the first Los Angeles installation of Cinemiracle.

A more cheerful note was struck in the report by Leo Moore, business representative for Hollywood Local 165. Moore stated that conditions in his Local have been ideal since mid-July with all members in full employment. As a matter of fact, an additional 19 men, members of other projectionist Locals, were hired to take care of the overflow of summertime jobs.

Next heard from was Don Marshall, business representative for Bakersfield Local 215, who reported that Fox is asking for a reduction in projection personnel, but offers the same conditions now enjoyed by Local 150. Marshall said that his Local is countering this offer with a request for a 50¢ increase over a four-year period. He also reported that two houses in the Local's jurisdiction are presently being surveyed for possible Todd-AO presentations.

(Local 150's new five-year contract calls for a wage increase of 10 cents per hour, plus 6 cents per hour for health and welfare. The existing manpower situation remains unchanged.)

At this point Harry Reynolds, delegate for San Bernardino Local 577, joined Marshall in requesting information on Local 150's contracts for both Todd-AO and "Ten Commandments." George Schaffer then reported that for the Todd-AO showings at the Carthay Circle Theatre, a 1136-seat house in Beverly Hills, the projectionists receive $28.70 per man, per performance, with the chief projectionist getting an additional $25 per week. There are two performances a day with two projectionists for each showing; no split shifts in this reserved seat house.

### *Two-Man Shift Maintained*

The two-man situation also prevails at Warner's Beverly Theatre in Beverly Hills, where the "Ten Commandments" continues its engagement. Each man receives one hour extra preparatory time per day on opening and closing shifts. Each crew runs one show per day, and the weekly pay averages $127 per man. Weekly average for Todd-AO is $172.20.

Reporting for San Diego Local 297, Leonard Hall stated that his Local was in the process of negotiations with an association of managers, and that agreement had been reached on health and welfare contributions of 6 cents per hour. Drive-in theatres in the Local's jurisdiction requested a reduction in projection personnel, but agreed to a renewal of the present contracts plus 6 cents per hour for health and welfare.

Hall also reported that the Local had signed up the Fox houses with a 10 cent-per-hour increase in scale, plus an immediate 5 cents-per-hour for the health and welfare fund. The latter will be increased to 10 cents-per-hour after one year. He also informed the delegates that Todd-AO has been installed in the Capri Theatre—a 750-seat suburban house, the contract caling for two men per shift, at $3.65 per hour, per man.

Santa Barbara Local 442 was represented by Johnny Gotchel who reported that with the assistance of Carl Cooper, IA 2nd vice-president, his Local finally reached an agreement and signed contracts with the Fox West Coast Theatres.

### *Projectionists at World Fair*

Ralph F. Adams, Council vice-president and business representative for Santa Ana Local 504, informed the delegates that he was in the midst of contract negotiations. The Local was asking for an increase of 20 cents-per-hour, plus 6 cents-per-hour for health and welfare. He also reported the construction of an electronics shop by the Wm. Raulke Company, where displays will be built for next year's Worlds Fair in Belgium. The Santa Ana Local plans to send two projection crews to the Fair—one consisting of six men who will remain there for 40 days, and the other of three men for 180 days.

Representing San Bernardino Local 577, Harry Reynolds reported as follows: Signed up three drive-ins, increasing the guaranteed shift time from 5½ to 6 hours, with a ten cents-per-hour increase the first year, plus an additional 5 cents per-hour hike for each of the following four years. Agreement with the drive-ins also calls for health and welfare contributions of 35 cents per shift the first year, 40 cents per shift the second year, 45 cents the third year, and 50 cents the fourth and fifth years. Average scale for the drive-in projection room is $158.00 for a six-day week. Contracts for Fox Theatres and the Pacific Drive-In are still pending.

Continuing with the report by Locals,

(*Continued on page* 34)

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**Social Security Contributions**

Social Security benefits are financed by worker and employer contributions. From 1957 through 1959 you will contribute 2¼ per cent of your earnings as a Social Security tax, and your employer will contribute an equal amount. Once you have paid taxes on $4,200 of wages from one employer in a year, you don't have to pay any more tax while you are with that employer during that year.

However, if you work for more than one employer in a year, and taxes are deducted on more than $4,200 in the year, you may claim the excess tax as a credit on your federal income tax return. Social Security taxes will be raised in 1965, and every fifth year thereafter.

*ILGWU Research Dept.*

# Projection CLINIC

**What Is YOUR Problem?**

## A Solution for Switch Clicks in Sound Systems

"MANY of the theatres in Pakistan are troubled by switch clicks coming over the sound systems," writes Mr. Yusaf Umar of Karachi. "Every switch which is not in a sound circuit gives a *click noise* which is heard in the sound-system speakers when the volume is turned up.

"In tracing out the trouble. I determined that these clicks are picked up by the PEC circuit which runs from the photocells to the main amplifier. I have checked the ground to all the equipment and found it perfect. To be on the safe side. I even made fresh grounds to the equipment, but I could not eliminate the switch clicks.

"We are using 930 photoelectric cells connected by coaxial cables to the main amplifier. According to the instructions of the American manufacturer, it is not advisable to change this hookup in any way. How do you suggest that I eliminate the switch clicks from the sound?"

IT MUST be admitted that "long-distance experting" is not always satisfactory in the case of obscure troubles. By "obscure" we mean that the real cause of the trouble may be any one of a number of things—or even more than one!

Clicks heard in the sound when light and power switches are operated, for example. immediately suggest faulty shielding or imperfect grounding of the photocell-to-amplifier cables, but these possibilities have been ruled out. We must, therefore, assume static pickup *through the power lines and the amplifier* into the photocell circuit.

### *High-Impedance Line*

The use of a high-impedance connecting line from each soundhead to the main amplifier is not the best designing practice; but we, ourselves, have often operated on such equipments, and we have had to make the best of them, correcting their defects whenever hum or other noise pickup made itself apparent. Sound-equipment manufacturers eliminate the long high-impedance photocell cables either by using a step-down transformer in each soundhead to give a low-impedance circuit or, better, by placing a preamplifier in or near each soundhead for the same purpose.

Because the various light and power switches in your projection room produce the clicks, it would seem advisable to "damp" the main power line by means of small capacitors. These are best connected across the 120-volt power-input line to your main amplifier. They will then be automatically disconnected from the AC power line when the amplifier is turned off.

Connect two 1-microfarad capacitors rated at about 250 volts in series, and bridge these across the AC power line to the amplifier as shown in the diagram. Connect a wire to the lead between the two capacitors, and attach this wire to the ground—the main frame of the amplifier (if already grounded), a water pipe, or similar grounded object. This expedient may or may not stop the clicks—we have no way of knowing. But if it only *reduces* the interference without eliminating it altogether, try larger capacitors (up to about 10 mfd).

## Aligning Film Magazines

MANY PROJECTIONISTS have formed the good habit of removing the upper film magazines from their projectors every few months in order to inspect and thoroughly clean the upper fire-valve rollers. It is also necessary to remove the upper magazine, and the fire-roller box as well, when installing an upper feed sprocket in Simplex Regular and Super Simplex projectors.

When replacing the magazine and fire-roller box, make certain that these components are in line with the upper feed sprocket. This is extremely important. The film should pass from the upper reel through the fire rollers and onto the upper sprocket without any twist or sidewise misalignment.

If any of these components be out of line laterally, the feed-sprocket teeth will pull the film by only one row of sprocket holes instead of evening up the load on both rows of perforations. The film may thus suffer damage, particularly in the last hundred feet or so of film in each reel, when film tension between the feed sprocket and the upper reel is greatest.

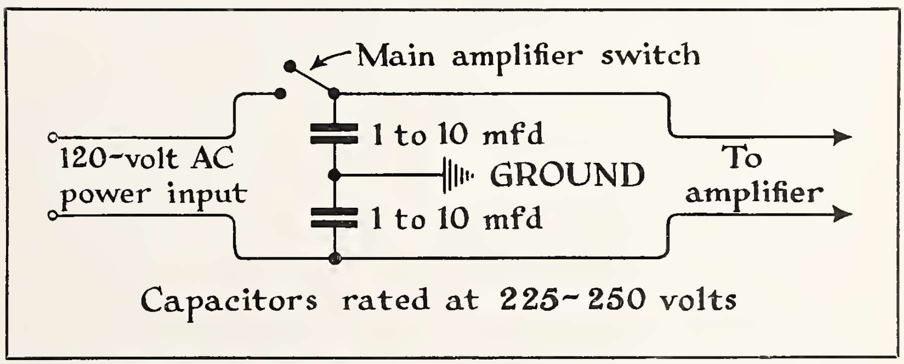
## Methyl Chloroform

*I have to do some film cleaning, but I don't want to use carbon tet. A commercial methyl chloroform product has been recommended as a good cleaner, but isn't that as toxic as carbon tet?*

METHYL CHLOROFORM is less toxic than carbon tetrachloride, but dangerous enough. It should never be inhaled for any length of time nor used where there is not adequate ventilation.

Although it is recommended for cleaning film, it has some disadvantages. If it has not thoroughly evaporated before the film is wound, it will cause a good increase in curl. It will soften Tenite plastic cores, and unless it has an inhibitor, it has a damaging chemical reaction with aluminum, zinc, and their alloys. It can also dissolve certain film lacquers.

Albeit a bit expensive, DuPont's Freon-113 is non-toxic, and a satisfactory cleaning agent.




Method of connecting capacitors across AC or DC power lines to eliminate the electrical interference which sometimes enters radios and sound amplifiers through utility lines. This hookup may serve to prevent the clicking noises generated by light and motor switches from coming over theatre sound systems. Note that the capacitor "bridge" is placed across the line *behind* the amplifier switch. This disconnects the capacitors from the line when the amplifier is turned off. The ground connection indicated in the drawing is essential to effective noise suppression.

# TELECASTS

## Cable Theatre Makes Its Debut

"PAJAMA GAME" was the initial movie offered subscribers when the Telemovie cable theatre began operations last month in Bartlesville, Oklahoma. Approximately 300 subscribers were prepared to receive the product, but more were coming in fairly fast order. There was a sizable backlog of orders, and on opening day six two-man crews worked around the clock to make installations. Hook-up work is still continuing at a rapid rate. This is the first use of the cable theatre closed circuit system; engineered and manufactured by Jerrold Electronics Corp., the control room also features equipment manufactured by General Precision Laboratory, and installed by National Theatre Supply. Details of this were described in IP for April 1957, page 14.

Set up on the ground floor of the Telemovies Building, the studio— measuring 21 by 26 feet—is in full view of the public. A large plate glass window enables passers-by to watch the program-originating equipment in operation, and to see the picture being run on monitor screens.

Since Video Independent Theatres plans to present a different motion picture simultaneously over two separate channels, duplicate installation of projection and control equipment has been made. Each of these channels utilizes two GPL 35-mm Telecast Projectors, a Vidicon film chain, a standby Vidicon camera, a Multiplexer, and a master monitor and control console. A third channel carrying news, weather, time, and music, is operated at a third control console. These units, plus other pulse generation and distribution equipment, make up the bulk of the necessary gear.

### *Modified Simplex Projectors*

The film projectors are the Simplex 35-mm XL theatre type specially modified for TV with a 3-2 shutter intermittent movement to synchronize the standard film projection speed of 24 frames per second with the TV transmission rate of 30 frames. The units are similar to those in use by a number of TV stations in major cities throughout the country. The projectors are also equipped with a separate shutter motor which remains in sync with the drive motor and allows still frame operation. The machines can be controlled at both their own and the console-monitor positions.

The standby GPL Vidicon Cameras, similar to those used in industrial and institutional closed-circuit TV installations, are ready for emergency service at any time it may be necessary to move the regular Vidicon film chains from operation for servicing.

The successful adapting of CinemaScope and Vista-Vision film product to the aspect ratio of home TV screens has been accomplished without lens changes or the use of an anamorphic lens. Rather, the sweep of the camera is altered electronically and is controlled simply by pushing a series of buttons on the monitor console.

Other buttons on the control console start, stop, and provide selection of telecast projectors, advance the slide projector mechanism, and vary the aspect ratio according to the type of film shown.

The studio floor plan (see Fig. 1) shows the layout of duplicate projection equipment, and the locations of 6-inch deep conduit trenches in the concrete floor. Carrying the electrical wiring and power supply, these are covered with removable steel plates for easy access to all cable.

Reception of the new system was generally favorable, but it is conceded from all sides that it is much too early to make any predictions of any kind concerning the future of cable theatre.

## 20th's Squeeze Problem

20TH CENTURY FOX contemplates that it will take about two years to unsqueeze its whole crop of CinemaScope product to make it available for TV. It has been working with a single optical unit.

A faster method has been suggested: the process now being used in the cable theatre in Bartlesville, Oklahoma, developed by General Precision Laboratories. This particular method allows for squeezing slightly with a variable anamorphic lens, and cropping slightly to a 1.66/1 ratio. Technicians consider that the lost information is negligible, and reports indicate that the GPL system is perfectly good.

However, 20th-Fox prefers to do its unsqueezing by an optional printer, a much lengthier process than the GPL

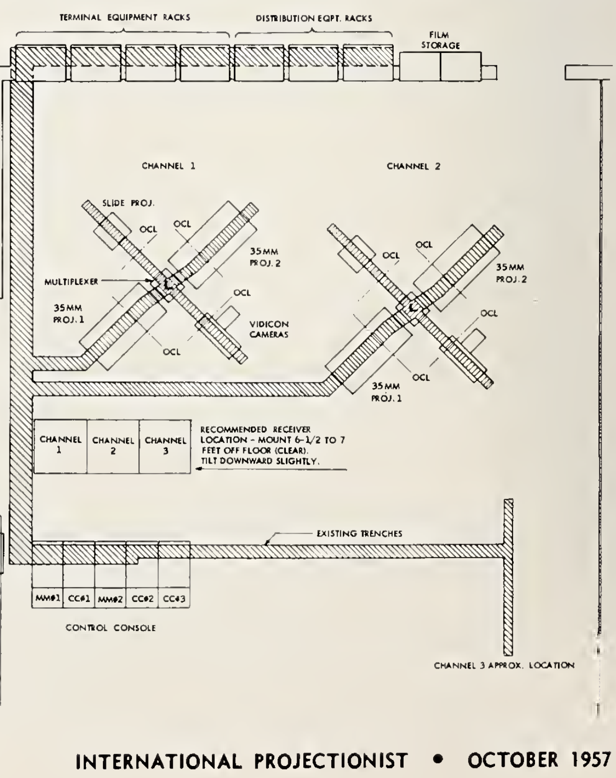



**FIG. 1. Floor plan of the Telemovies studio showing equipment and trench locations. OCL—Optical Center Line; MM—Master Monitor; CC—Control Console.**

version. The studio maintains it is not in a hurry, since the sale of CinemaScope product to TV is still well in the offing. It, nevertheless, is going ahead with plans to unsqueeze the entire backlog of CinemaScope pictures.

## 3-D on TV

A THREE-DIMENSIONAL closed-circuit color TV system has been developed by the General Electric Company. It will be used for remote servicing of reactors used in the development of a nuclear aircraft propulsion system.

Primary reason for development of the 3-D TV was to permit use of color-coded parts in reactor components, and to provide the degree of depth perception required for their correct positioning. Its first use will be at the GE aircraft nuclear propulsion department at the Atomic Energy Commission's test site at Idaho Falls, Idaho.

The system will also be adapted to use in other closed-circuit applications, including sales conferences, shareowner meetings, switching operations in railroad yards, process controls in automatic factories and inspection and maintenance of work.

### *How the System Works*

The system works like this:

The observer's viewpoint is transferred to that of a camera equipped with a dual-optical system having a perspective similar to that of the eyes of the observer. However, instead of presenting the pictorial image of two sensitive surfaces, as the human eyes do, the stereo-TV system presents two images to a single sensitive surface, a television tube, on a time-sharing basis.

The frequency of the time sharing is at the picture rate of the TV system—90 pictures a second. Any objectionable flicker has been eliminated by alternating 45 pictures a second for each eye.

The special color-TV camera has a rotating shutter which alternately transmits the scene as viewed from two points to the camera's tube. The distance between the two points corresponds approximately to twice the distance between a person's eyes.

In the viewing console, light from the TV image formed on the cathode ray tube passes through a drum composed of alternate segments of polarizing filters with axes of polarization at right angles to each other. The drum revolves in sync with the TV frame rate of the camera, and polarizes alternate frames vertically and horizontally. All left-eye pictures are polarized in one direction, and all right-eye pictures are polarized in the other direction.

The observer views the screen with polarized spectacles, seeing the left optical path with his left eye, and the right optical path with the right. The 45-frame-per-second rate gives him a stereo-vision without an objectionable flicker.

Laboratory tests were conducted on a closed-circuit system using 250 feet of cable, but engineers say the cable can be lengthened to any required distance, or replaced by a radio link without losing clarity, color, or three-dimensional effect.

FIG. 2. Interior view of the Telemovie studio with projection equipment. Shown are Ted Asplund, project engineer for General Precision Laboratory, and Robert Clark, executive of Video Independent Theatres, Inc.

## Colorcast for B & W

BLACK-AND-WHITE film may soon be telecast in color using a new process under development by Bryg, Inc., of Pennsylvania. The all-electronic TV system would provide color reproduction, while permitting the advantages of black-and-white filming and fast processing. It would also provide more accurate reproduction of color and color film now in use.

There is also a mechanical system being developed. This requires the use of color filters in the camera taking the pictures, as well as in the projector by which they are shown. The filters register a color value on the film when the pictures are taken. In turn, when the pictures are shown through a similar set of filters, the color is restored.

The Bryg firm's electronic system will employ a different technique of filtering to achieve the same result. Officials of the company state that mathematical and electronic design problems have been solved.

## TNT's Bout

174 THEATRES in 130 cities throughout the United States and Canada carried the Ray Robinson-Carmen Basilio middleweight championship fight on closed circuit TV. Operated by Theatre Network Television, it was the largest closed circuit ever put on, requiring a total of 150,000 pounds of electronic equipment valued at more than $1,000,000, shipped thousands of miles throughout the U. S. and Canada. The action was projected on to screens ranging up to 50 to 65 feet.

The telecast was the 140th such operation for Theatre Network Television, and it is interesting to note that while a 500,000 patron potential was considered, and attendance records expected to be broken, actually returns "fell below expectations." However, TNT was satisfied that both the presentation and the fight were of top order.

## Color Video Tape

COLOR VIDEO TAPE is not yet a fact, but, according to Ross Snyder of the Ampex Corporation, there is no reason why it should not be in the next five years. Although at a recent video tape symposium Snyder declined to say whether a video tape color image has already been produced, he indicated that "A lot can happen in this direction." Indications are that color recorders will be of the same basic design as present black-and-white models, convertible for use with color. This would probably mean replacing a magnetic head or some components on present units.

The life of audio tape is about 100 times greater than that of video tape, although video tape has been improved to the point of use in excess of 100 plays. The life of the rotary head in the Ampex machines is far greater than the video tape.

**Of especial interest is this month's contribution from England: an expert appraisal of Robert Mitchell's new "Manual of Practical Projection," with a comparative discussion of parallel British methods and material.**

# From the British Viewpoint

## By R. HOWARD CRICKS

I HAVE BEEN reading Robert A. Mitchell's new book with great interest: first, because it is a really valuable treatise on the art and science of projection, containing a vast amount of really practical information; secondly, because in a number of respects it demonstrates interesting differences in practice between our two countries.

### Film Care

To start with Chapter 1: I have indicated in a previous article that our exchanges are today thoroughly print-conscious, and it is only the projectionist in the umpteenth-run show who often has cause for complaint of the condition of his programme.

I am a little surprised that the old idea of a sandpaper block should be still recommended for cleaning the film before splicing, because of the risk of sand remaining on the film and causing abrasion. Here the dry scraper, which forms part of the Premier splicer and is made in the form of a file, accurately mounted to slide in contact with the film, is increasingly popular. With the minimum of skill, and no risk of cutting through the film, it makes a clean scrape with a rough surface for the emulsion to bite upon.

I suspect we have Mr. Mitchell to thank for the recent adoption in this country of the system of lubricating film by wiping an oily cloth on the edge of the reel. At a recent meeting of the Theatre Division of the British Kinematograph Society, the system was unofficially approved by several exchange representatives present.

### Projector Types

Coming to the subject of projectors, the Simplex style projector is apparently almost universal in American theatres. Here there are four main types of projectors which have no similarity in design, except for the use in all of them of a Maltese cross very much larger than that of the Simplex. All post-war projectors have pump lubrication, so that the tragic events which followed "Because somebody forgot to oil the intermittent!" are practically unknown.

I heartily agree with Mr. Mitchell's endorsement of the Powers pin-cross. I have often advocated its re-introduction, but no manufacturer seems to be prepared to tool up for making it. Perhaps, too, the tin-can mechanism which surrounded it has created prejudice against it.

One not unimportant point of design which in this country is regulated by law is the take-up drive, which is required to have either a gear or chain drive to the friction—originally to prevent the risk of fire in case of a belt breaking.

The qualifications needed in your country to obtain a projectionist's license are certainly impressive. Our sole legal requirement in this country is that the projection room shall be in charge of a "competent operator"—what this term means nobody knows!

### Arc Lamp Development

Mr. Mitchell seems to have a poor opinion of the "simplified" HI arc, with non-rotating positive. It may need a little more skill to obtain consistent results on the screen, but it is certainly more efficient in terms of lumens per watt, and before the days of wide-screen and CinemaScope was used in many of our largest theatres.

However, to an increasing extent the Peerless Magnarc (made in this country by J. Frank Brockliss, Ltd.) is being installed in the larger theatres, while Mole-Richardson (of London, not Hollywood) has recently produced a high-efficiency arc with water-cooled jaws and rotating positive, which is being installed in a small number of theatres. It is handled by Rank Precision Industries.

Drive-in theatres have of course not reached this country, and probably never will, because during the summer months it would not be dark enough until 9 or 10 p.m. British summertime, and we English people are not late birds. The chapter on drive-in theatres indicates the appalling problem that has to be faced to obtain a reasonably well-lit picture.

The article on this subject was of course written before the Harkness or "Uniglow" screen had made its appearance. I learn that this screen is already being tried out in drive-ins, and should represent a very big advance over the previous types, since it provides maximum reflectivity over a considerable viewing angle.

### Generators and Rectifiers

I do not recall having seen in any projection text-book so complete a description of the motor and generator. I am afraid I have been guilty of taking them for granted, notwithstanding the important part they play in the running of the show.

The section on arc conversion gear would have been quite a surprise to me if I had not been already aware of the different tendencies in our two countries. Over here the motor-generator and rotary convertor are quite obsolete (many years ago the generators taken out of cinemas were coupled up with the engines from old cars, and sold to fair-ground showmen!).

The most widely used conversion gear is the mercury rectifier, with the metal rectifier (formerly copper oxide, now selenium) some way behind it, but catching up. Before the war a few thermionic rectifiers similar to the Tungar were installed, but during the war it was impossible to obtain replacement bulbs, and they were mostly converted to mercury.

The suggestion that the mercury rectifier is unreliable certainly does not apply to this country. The pioneer mercury rectifier was the Cooper-Hewitt, which developed out of the mercury discharge tube once used for lighting in the film studio. Some of the earliest equipments were still in use not many years ago; it is probably safe to say that no mercury rectifier of modern type has yet worn out, although rarely the bulbs have to be replaced for various reasons.

Rectifiers are of two main types: the unit type, often installed alongside the projectors, and the heavier type intended to be put in a special rectifier room.

Mr. Mitchell makes only the briefest reference to a very important function of conversion gear—the control of arc current in relation to arc voltage. All modern mercury rectifiers provide choke control, which gives a volts/amps characteristic equalled by a ballast resistance only with quite a high line volts. Of particular interest is the circuit of the Westinghouse metal rectifier, which makes use of a resonant circuit, with chokes and condensers, to provide a volts/amps curve such that when the carbons are touched for striking, a very small current flows; it is in fact becoming increasingly popular to strike the arc at the full-load setting of the controls.

### *Sound and 3-D*

The synchronous disk is—heaven be praised, as Mr. Mitchell remarks—a thing of the past. But there are still many Western Electric universal bases in use, of course with the turntable removed. They seem to last for ever!

One aspect of sound which, if I may suggest it, might have been more fully dealt with is magnetic reproduction; I find many projectionists are not at all clear as to how this works. I fully agree with the views expressed on auditorium speakers; the majority of stereo installations in our theatres have no auditorium speakers installed, and those that have them often use them only for interval and play-out music.

Finally, does Mr. Mitchell consider that the 3-D picture will return? Personally I hope so, for, properly presented (as it rarely was) stereoscopy added enormously to the realism of the picture. Over here we rather pride ourselves on the belief that it was the 3-D films at the Telekinema, during the Festival of Britain in 1951, that aroused public interest and led to the adoption of the system.

No doubt the author's knowledge of the Vectograph principle is more up-to-date than mine, but the serious drawbacks which he cites seem to me to pale into insignificance before the immense difficulties of producing Vectograph films. Some years ago I studied the patents, which are quite frightening.

To summarise: "The Manual of Practical Projection" is an immensely valuable book, which will undoubtedly find wide favour everywhere that English is spoken and films are shown.

## THE CARE AND CLEANING OF SCREENS

(*Continued from page 10*)

rough-textured white paint to eliminate sheen and thus insure perfect diffusion of the light. When modern titanium-white and magnesium-carbonate pigments are used for surfacing, this older type of screen gives excellent projection results. The rough painted surface readily captures dust, however, and provides a large surface-area for the condensation of tars and other volatile impurities in the air which constantly circulates through the sound perforations. These screens may be advantageously cleaned only when slightly soiled. Resurfacing is indicated when they become yellowish or visibly streaked.

### Clean Back of Screen First

The sound perforations of theatre screens necessitate the most cautious screen-cleaning methods. Dust, often of a sooty nature, lodges in the perforations and must be removed before the front surface is cleaned. Failure to heed this precaution may result in streaking the screen.

When cleaning any perforated screen, new or old, *first vacuum the back surface to draw out the dust which is present in the sound holes.* The front light-reflecting surface may then be brushed, washed, or repainted without danger of smearing the screen.

Use the extension or brush attachment when vacuuming a screen, and *vacuum only the rear of the screen, NEVER the front surface!* A vacuum cleaner in good working order will insure against putting dust upon the light-reflecting face of the screen.

It will be necessary, in most theatres, to move the speaker units back out of the way before vacuuming the rear of the screen. But before doing this, mark the positions of the speaker cabinets and baffles upon the stage floor in yellow crayon or blue marking chalk. The speaker units may then be returned to their former positions after the screen has been cleaned. Guard against damaging or wrongly connecting the speaker cables.

### Brush Front of Screen

After the back of the screen has been vacuumed, brush the front surface in downward strokes with a wide *soft* brush which is known to be scrupulously clean. *Never apply to a screen a brush which has been used for other purposes. Never use a brush having stiff bristles, as these may imbed gritty particles in the screen surface.*

Begin at the top of the screen, brushing downward, and work your way across its entire width. Then go all the way across the bottom half with the same vertical strokes. When you have finished, clean the brush and wrap it in a clean cloth to protect it. Screen brushes are best kept under lock and key, preferably in the projection room.

Many old-style screen surfaces cannot be washed without removing some of the screen paint and streaking the screen. We reserve the washing operation only for new-style plastic screens having the light-reflecting pigment suspended in the plastic surfacing.

The original reflecting powers of old-style matte and aluminum screens can be restored only by resurfacing with high-quality screen paints. In fact, screen reflectance, after resurfacing, may even slightly exceed that which the screen had when it was new! This may be attributed to two factors, namely, the superiority of present-day screen paints and reduction in the size of the sound perforations with each repainting. The latter factor is not appreciable so far as apparent brightness of the picture is concerned, but it may have pronounced effect upon the quality of the sound reproduction.

### Effect of Plugged Perforations

It may be thought that partial plugging of the screen perforations would cause nothing more than an inconsequential loss of sound volume. True, the total attenuation of sound energy by holes of reduced size is very slight, but this attenuation unfortunately occurs in the higher frequencies. The result, when the effect of plugged holes is pronounced, is "muffled" sound. Although this trouble may be remedied by overamplifying the high frequencies relative to the low frequencies, the installation of a new screen of better transmission characteristics is preferable.

The sound perforations occupy from 8% to 10% of the total area of the screen surface. This means that a perforated screen has from 92% to 90% the brightness of a solid (non-perforated) screen of the same type and condition.

No noticeable effect on sound reproduction is produced, however, until the holes of a canvas screen have been reduced to about a quarter of their original size by the repeated application of screen paint. (Thin plastic screens can stand an even greater reduction of perforation size before the sound is affected.)

But if the perforations occasioned a light loss of 9% when the screen was new, the resurfaced screen having holes paint-filled to the extent of 75% of the original perforation area will show a brightness gain of $(9\% \times 1/0.75) - 9\% = 2\%$, very nearly. This light increase is too small to be perceived; and the attendant risk to good sound quality is too great to be tolerated. Therefore avoid plugging the sound holes when resurfacing an old screen.

### Resurfacing Old-Type Screens

To repaint an old-style perforated screen, apply two thin coats of the best-quality screen paint by means of a spray-gun. Let the first coat dry thoroughly before applying the second. Do not use a brush to paint a perforated screen, as this will clog the sound holes. Be extra careful to apply a number of *very thin* coats when repainting aluminum screens, as unavoidable runs in thick coats are visible in the picture as spots and streaks.

For matte screens use lead-free flat white screen paints of the titanium-magnesium type having reflectances of from 0.90 to 0.95 when applied to a solid surface. For metalized screens employ medium-gain bright aluminum paints made especially for screens. Theatres of moderate width may bene-

### Red Face Department

Well—anyway, we got this letter:

"Your article, 'From the British Viewpoint,' in the May issue refers to me as 'Mr. Loren F. Rider of 20th Century-Fox.' I have apparently been confused with your esteemed countryman, Mr. Loren L. Ryder, of Ryder Sound Services, so I would take this opportunity of signing myself as . . .

LEONARD F. RIDER, Chief Engineer
20th Century-Fox Co., Ltd.,
London, England."

Our apologies to Messrs. Loren and Leonard. Sometimes we don't know our own name.

fit if a thin coat of white screen paint is applied over two coats of the brightest aluminum paint. This will brighten the picture over the main viewing area.

Most modern screens consist of a plastic material, with or without cloth backing; and only this type of screen, as we have said, may be safely and advantageously washed. These screens have the light-reflecting pigments suspended *in* the plastic layer where surface-washing cannot possibly remove or otherwise affect them. Such screens should not be painted. Their original brightness is restored by washing.

Before washing your plastic screen, vacuum the rear surface and brush the face according to the procedures previously given. The more dust you can remove before applying moisture, the more satisfactory the washing operation will be. But be very careful, when working on a thin plastic screen, not to dent it. This requires constant vigilance while using the vacuum cleaner on the back of the screen.

### Washing Plastic Screens

Use a large sponge dipped in a *weak* solution of pure soap in pure water, and squeezed out so that the sponge is damp, not dripping wet. A mild detergent may be used instead of soap, if desired; but the solution must be weak! Never apply such solvents as alcohol, acetone, carbon tetrachloride, naphtha, gasoline, etc. to a plastic screen. Certain plastics are softened, frilled, blistered, or even dissolved by organic solvents.

*Wash the front of the screen only, and with vertical strokes from the very top of the screen to the very bottom.* Apply the wet sponge gently, so as not to dent the screen or damage its surface. Don't wash too large an area at a time, for it is essential to wipe off the dirt-polluted wash-water with a clean, nearly dry sponge wrung out in clean water from time to time.

When one small vertical section has been washed and dry-sponged, advance horizontally to a new vertical section, repeating the operation until the entire surface has been washed and dried. Your screen will then perform like new, giving daylight-bright images having maximum clarity and contrast.

Washing the plastic screen is mandatory whenever soft candy or fruit has been thrown upon it. Projectionist Jean Neimoyer of Eureka, California tells us about a screen soiled by chocolate candy which front-row delinquents had hurled at movie villains. The manager succeeded in removing the sticky mess and in restoring the screen to a state of clean brightness with warm water to which was added a small quantity of a liquid household cleanser. A certain element of risk is involved in this procedure, however.

Because warmth softens and deforms certain plastic screen materials, we hesitate to advise the use of *warm* water. Stay on the safe side, therefore, by washing screens in water no warmer than the prevailing room temperature. This means *lukewarm,* not *cold,* water.

The use of commercial liquid cleansers is also fraught with danger. Many such household cleansers are comparatively harmless aqueous solutions of mild detergents, but others are either organic solvents or solutions of corrosive alkalies. Stick to Ivory soap or Lux soap-flakes, and your screen will be safe from destruction by chemicals.

We recommend the removal of candy and similar foreign matter from screens in the following way:

1. Gently scrape off the bulk of the foreign matter with a wooden spoon of the kind used for eating ice-cream. Take care not to scrape down to the actual screen surface. Unplug sound perforations with a toothpick.

2. Sponge off the remaining matter with a swab of clean cotton cloth moistened with lukewarm soapy water. Keep the wetted areas on the screen as small as possible, and press a dry

cotton cloth against the screen *very lightly* underneath the soiled area to prevent water from running down the screen.

3. Swab off the remaining stain with a clean cloth dampened with pure water.

4. If it seems necessary, wash the entire screen by the previously given routine *unless the screen is of the old surface-painted canvas type.*

### Screen Maintenance Tips

An ounce of prevention is worth a pound of cure, they say. To *prevent* a screen from becoming excessively dirty is good common sense, for soiled screens waste enormous amounts of light (which represent high carbon and current expenditures) and require frequent laborious cleanings or repaintings. Visible streaks and isolated spots of dirt are very annoying to patrons.

A perforated sound screen is unfortunately a natural dirt-catcher. Air circulates through the sound holes continually, carrying dirt particles which lodge in the holes and settle upon the light-reflecting surface. We can't stop the circulation of air, but we can take simple precautions to minimize the amount of dust passing through the sound perforations.

Keep the backstage area clean! Remove the clutter of old shipping crates, packing materials, cardboard and paper waste, unused vaudeville props, etc. upon which thick layers of grimy dust accumulate. Store stage furniture neatly at one end of the backstage area and carefully sweep the floor with a damp broom. Remove dust from the speakers and baffles, and, if sound drapes are used for killing back-wall echoes, give them a thorough cleaning.

Janitor work on so large a scale is not normally a part of a projectionist's duties; but because the responsibility for a clean and orderly backstage area is shared by the projectionist, he has every right to request the management to have this work done.

Be sure that the curtain is kept closed in front of the screen after the last show at night and in the morning when the janitors are cleaning the auditorium. The screen will thus be protected against some of the dust unavoidably raised by the daily auditorium sweep-down. And if your theatre has a grand drape (front curtain) in addition to the title curtain, close both while the janitors are at work. The cleaner your screen, the brighter, clearer, and more uniformly illuminated will be the picture. The picture projected upon the screen, be it remembered, is what our patrons pay to see.

[THE END]

### Social Effects of Motion Pictures and TV

Because of motion pictures and TV the people of the United States no longer have to depend on second-hand accounts of world events that shape their lives but, in a visual sense, are present at those events and see and hear for themselves what takes place, stated Jack Woolley, special assistant for Public Affairs to the Secretary of the Navy, at the recent SMPTE Washington meeting. The whole picture of the world that people have in their minds has been changed, Mr. Woolley asserted, as a result of these technical advances.

### Are You Moving?

If so, please notify us one month in advance. The Post Office does not forward magazines. To avoid delay, please cooperate by sending us both your *new* and *old* address.

# Closed-Circuit TV Takes Precedence at SMPTE Convention

THE 82nd semi-annual SMPTE convention held early this month at the Sheraton Hotel in Philadelphia was highlighted by the varied program of technical sessions relating to closed-circuit TV, motion picture projection, video tape recording, motion-picture laboratory practice, and color and large-screen TV. Abstracts of some of the technical papers read at these sessions that should be of particular interest to projectionists are described following this report.

Presentation of awards was a feature of the convention's activities. The Progress Medal of the SMPTE was awarded to Dr. Ralph M. Evans, director of the color technology division at Eastman Kodak Co. The gold medal, representing the Society's highest award, is presented each year in recognition of any research, invention, or development which, in the opinion of the Society, results in a significant advance in the development of motion-picture technology. The award was presented this year to Dr. Evans for his outstanding achievements in the development of motion-picture color films and in the art of color photography generally.

Col. Richard H. Ranger, president, Rangertone, Inc., received the Samuel L. Warner Memorial Award which is presented each year for outstanding work in the field of sound motion-picture engineering. Col. Ranger received the award for "the invention, development, and application of a method of electronically synchronizing sound recorded on magnetic tape to the motion picture camera." The Herbert T. Kalmus Gold Medal Award for the development of color processes, films, techniques, or equipment useful in making color motion pictures for the theatre or TV was presented to Wadsworth E. Pohl, technical director of Technicolor Corporation's motion picture division. Earl M. Lowry

Earl W. Lowry (left) and J. Gordon Jarvis, co-authors of the paper, "The Luminance of Subjective Black," for which they received the Society's Journal Award.

Dr. Ralph M. Evans

and J. Gordon Jarvis of Eastman Kodak Company received the Journal Award for the most outstanding paper published in the SMPTE Journal during the preceding year. Charles P. Ginsburg, Ampex Corporation, received the David Sarnoff Gold Medal Award for the development of a practical videotape recorder.

Two distinguished members of the Society were enrolled as Honorary Members: Kenneth C. E. Mees, formerly with Eastman Kodak Company, and Earl I. Sponable, of Twentieth Century-Fox Film Corporation. The distinction of Honorary Membership in the Society is awarded to living pioneers of the motion-picture art whose basic contributions represent a substantial forward step.

## *Papers Abstracts*

### THE OPTICS OF THE LENTICULAR COLOR-FILM PROCESS

R. KINGSLAKE

Eastman Kodak Co., Rochester, N. Y.

In spite of the fact that the lenticular color-film process has been known for fifty years, very little commercial use has been made of it largely because of the lack of suitable lenses. The requirements of the various optical components used in cameras, printers and projectors are discussed, and it is shown that every optical requirement can be met. However, this will often require specially designed lenses, which are likely to be unusually large and consequently expensive.

### TELEVISION FILM STANDARDS

K. B. BENSON and J. R. WHITTAKER

CBS-Television, New York

The TV system requirement and audience environment conditions differ materially from those common to motion-picture theater practice; thus, it is necessary that the standards followed for the production and processing of films for TV take into account these differences. In addition, the increased complexity of the combined motion-picture and TV system over the direct-projection system limits the degree of freedom permissible in any phase of the operation. The standards for control of the combined motion-picture and TV system are developed by an examination and correlation of the relationships between the two component processes and the effects upon the end product.

### THE PROJECTION OPTICAL ASSEMBLY CONSIDERED AS AN INTEGRAL SYSTEM

HAROLD E. ROSENBERGER

Bausch & Lomb Optical Co., Rochester, N. Y.

The function of each of the optical components of the projection assembly and the interrelationship between these components are discussed. The true f-number of the system is contrasted with the f-number of the projection lens, considering the effects of going to higher speed systems. The components of an up-to-date optical projection system including the new multilayer light-reflecting, heat-transmitting reflectors are described.

### AVERAGING SCREEN-ILLUMINATION READINGS

ARMIN J. HILL

Motion Picture Research Council, Hollywood

In obtaining the total output of a projector, or the total illumination which falls on a projection screen, it is customary to read the incident intensity at selected points in the illuminated area. These readings are then averaged by a suitable weighting formula to give the average over the face of the screen. This paper discusses some of the more commonly used formulae, considers their relative accuracy and the effects of various screen aspect ratios on the results obtained with them. It also analyzes various types of errors on the basis of an idealized distribution pattern which experience has shown checks closely with practical results.

### CAN XENON ARC LAMPS REPLACE CARBON ARC LAMPS?

WARREN B. REESE

Prepared Jointly by Macbeth Corp., Newburgh, N. Y., and OSRAM, Munich, Germany

Xenon arc lamps have inherent properties as to spectral energy characteristics, luminous efficiency, electrical operating characteristics, and geometrical characteristics which make them attractive, from both a technical and an economical point of view, as the first new light source which is feasible as a replacement for the traditionally used carbon arc lamps in motion-picture film projectors. Technical data on xenon lamp operating characteristics, projector optical design, and screen brightness measurements will be discussed fully. Practical experience as a result of xenon lamps already being used in film projectors will also be covered.

### RESEARCH COUNCIL BRIGHTNESS METER

PETRO VLAHOS

Motion Picture Research Council, Hollywood

The measurement of theater screen brightness could be determined with reasonable certainty with simple illumination-type in-

truments before the advent of the gain-type screen. Because the brightness of a gain screen is greater than unity, it became necessary to utilize a brightness reading instrument for determining motion-picture screen brightness. At the request of the Research Council's Theater Projection Committee, a low-cost, simple, and reliable screen-brightness meter has been developed. This instrument is unique in that it is of the comparison type but whose comparison target is automatically color matched to the color of the viewed object. The instrument uses a standard flashlight battery but accuracy is independent of battery age. The brightness meter does not require nor does it contain a zero or reference adjustment. The paper describes the theory of operation and the principle upon which this design is based.

### PHOTOGRAPHIC DUPLICATING OF VARIABLE-SOUND RECORDINGS

J. F. FINKLE
Eastman Kodak Co., Rochester, N. Y.

A sound recording quality comparison is made between prints made directly from original variable-area negatives and prints made from photograpic duplicate negatives. The relationship of the densities of master positive and dupe negative to cross-modulation distortion, signal-to-noise ratio, and frequency response of final print is discussed.

### THE AMPEX VIDEOTAPE RECORDER: AN EVOLUTION

CHARLES P. GINSBURG
Ampex Corp., Redwood City, Calif.

The Ampex Videotape Recorder came as a considerable surprise to the TV industry, when it was demonstrated in April, 1956. Behind the machine was a long development project whose story has never previously been told. The approaches which failed, the unexpected solutions which turned up while searching for others, the experiments that succeeded, and the interplay of technical contributions by the staff's creative personalities are described by the head of the project.

### MAGNETIC TAPE FOR VIDEO RECORDING

R. A. von BEHREN
Minnesota Mining & Mfg. Co., St. Paul, Minn.

The new video tape recording systems now in commercial and experimental use require special magnetic tapes differing in design from standard types, and manufactured to a standard of perfection which a short time ago was believed impossible to achieve. This paper discusses some of the unique features of video recording tapes and the problems encountered in their development.

### SURVEY OF LARGE-SCREEN TV PROJECTION EQUIPMENT

FRANK N. GILLETTE
General Precision Lab., Pleasantville, N. Y.

The large-screen equipment available to the industry in the period around 1950 was described to the Society in a number of different papers. Since that period certain changes have taken place in the equipment, but these changes have passed generally unnoticed because of the relatively dormant state of the closed-circuit field. A survey of the equipment now used in this very active field is presented.

### TYKOCINER'S SOUND PICTURE CONTRIBUTIONS

JOHN B. McCULLOUGH
Chairman, Historical and Museum Committee

Professor Joseph T. Tykociner, now 90 years old, in 1922 demonstrated his system of recording sound optically by means of a variable-density soundtrack with a single-system camera as a result of many years of experimentation. During that year, he made one of the earliest public demonstrations of talking motion pictures. Professor Tykociner's other contributions to the field of electronics will also be described. The paper will be followed by a showing of his first film and attempted reproduction of its recorded sound. Acknowledgment is made to

Edward W. Kellogg, Glenn E. Matthews, Joseph E. Aiken and Arthur Wildhagen for their counsel in preparing this milestone tribute to one of our early motion-picture pioneers.

### ADVANTAGES OF USING A CONTROLLED PROJECTION SCREEN WITH PROJECTION TELEVISION

**W. T. SNYDER and E. F. JOHNSON**
**Universal Screen Co., Clinton, Mass.**

This paper discusses brilliance comparisons and methods of obtaining brilliance results. Comparisons are made using the matte-surface magnesium-carbonate block as the criterion. Brilliance ratings and their ratio to horizontal and vertical controls are discussed. The paper also covers light output of projection TV units and its ratio to screen brilliance and considers light resistance, color rendition, tone graduation and resolving power of lenticular screen material.

### PROGRESS REPORT ON INFRARED TRANSPARENCY OF MAGNETIC TRACKS

**GEORGE LEWIN**
**Army Pictorial Center, Long Island City, N. Y.**

A report on further test of the infrared transparency effect, including some preliminary work on 35-mm reproducers and additional 16-mm demonstration material. The first report appears in the September issue of the *Journal.*

### A HIGH-BRIGHTNESS TV PROJECTION SYSTEM

**G. W. ELLIS and C. L. ELLIS**
**General Electric Co., Syracuse, N. Y.**

Of all the types of TV projection systems used today, the Eidophor is unique. Being of the "light-valve" type, it is capable of brightness comparable to film projectors. The principles of operation are reviewed with a description of the methods used to achieve almost completely automatic operation. Some interesting applications are discussed.

### MEDIUM-SIZED SCREEN COLOR TV PROJECTION

**S. L. BENDELL and W. J. NEELY**
**Radio Corp. of America, Camden, N. J.**

Closed circuit television has created a need for picture display equipment suitable for large groups. Basic engineering and economic factors influencing the design and use of such equipment are discussed. The wide variety of applications for such a unit dictates that special emphasis be put on compactness, mobility and easy operation. These requirements have resulted in the design of a small inexpensive TV projector suitable for color or monochrome. Its operational features are described.

## OBITUARIES

LONG, FRANK, 67, member of Local 143, St. Louis, Mo., died of pneumonia on August 21. He was a member of the Local for the past 45 years, and prior to his retirement last year he had worked as projectionist in several top theatres in St. Louis. His wife and a daughter survive him.

• • •

ZERN, PAUL G., business representative for San Francisco Local 162, died suddenly on September 17 last, while attending the joint California State Federation of Labor and Theatrical Federation Conventions in Oakland, Calif.

• • •

DAGENAIS, CHARLES, member of Local 257, Ottawa, Ont., Canada, died September 13. A member of the Local for the past 11 years, he was very popular with the membership. At the time of his death he was a projectionist at the Rideau Theatre in Ottawa.

• • •

WEAVER, JOHN H., veteran member of Pittsburgh Local 171, died last month after a lingering illness. He had worked in the projection room at the Garden Theatre there for a number of years prior to his illness.

• • •

OWEN, HARRY, 57, member of Detroit Local 199, died following a heart attack. A projectionist for many years, he worked in a number of theatres in and around Detroit. Serious injuries suffered in an accident about a year ago kept him confined to his home.

• • •

AMREIHN, JOSEPH W., 65, member of Local 388, Youngstown, Ohio died last month. For many years he served the Local as secretary-treasurer and as business representative. Prior to his death he worked as projectionist at the Warner Theatre in Youngstown.

### Universal Profit is $1,887,498

Universal Pictures Co. and subsidiaries report a profit of $1,887,498 for the 39-week period. This compares with $2,227,933 for the 39-week 1956 period —not including non-recurring capital profit of $1,021,000.

### UA Nets $1,196,000

The initial half of 1957 saw the net earnings of United Artists reach $1,196,000, compared with $989,000 last year. Gross income was $32,498,000, in contrast to $27,342,000 last year.

## PERSONAL NOTES

Walter E. Green, president of National Theatre Supply Co. for 29 years, has announced his retirement effective December 31. Green has been in the mo-

Walter E. Green

tion picture equipment field for 48 years, starting his career with the Kinetoscope division of the Thomas A. Edison Co. He is a vice president and member of the board of directors of General Precision Equipment Corp., and serves as an officer and director in various other GPE subsidiaries.

* * *

Barry Passman, formerly vice president in charge of engineering for Simplex Equipment Corp., has accepted an appointment as director of engineering for Graflex, Inc., of Rochester, New York. Harry DeFuria succeeds as chief engineer of Simplex, in charge of all activities in the engineering and inspection departments.

* * *

Albion Edgell is the new manager of industrial products sales for Ansco. The position requires formulating plans and policies concerning the marketing of Ansco professional products for the industrial field. Edgell was a member of the Ansco graphic arts field force.

* * *

Gerry Rich will be the general sales manager for Florman & Babb, Inc., New York City, motion picture and TV equipment suppliers. Formerly with Camera Equipment Co., Inc., Rich has been in motion picture equipment sales for ten years, equipping and installing motion picture production units in many industrial plants, colleges, and TV stations. He will be joined on the sales staff by Leonard W. Hollander, formerly of DeLuxe Laboratories in New York, who will specialize in non-theatrical and audio-visual services.

* * *

Richard Rachals was named vice-president in charge of engineering for Kollmorgen Optical Corp. A native of Pittsburgh, Penna., Rachals received his

Richard Rachals

degrees of mechanical engineer and master of science from Stevens Institute of Technology. During World War II he was technical assistant to the president of Gibbs & Cox, Inc., naval architects. Prior to joining the Kollmorgen organization, he was executive engineer of the Edo Corp., College Point, N. Y.

* * *

Philip M. Mikoda has been appointed manager of sales publicity for Ansco, the photographic manufacturing division of General Aniline and Film Corp. With

Philip M. Mikoda

Ansco for 15 years, Mikoda tok an active part in the introduction of Ansco color film. He will be responsible for

planning, scheduling, and handling all sales publicity activities.

* * *

Roland A. Colistra has been promoted to treasurer-comptroller of Westrex Corp. Joining Westrex in 1928 as a tax accountant, Colistra rose in the ranks to comptroller in 1952. He is a director of three Westrex subsidiary companies—Westrex Asia, Westrex East, and Westrex Iberica, and is treasurer and secretary of Westrex Orient and twelve other subsidiary companies.

Roland A. Colistra

## Sound Pioneer Honored by Electrical Engineers

Arthur P. Hill, one of the pioneers in the technical developments that brought about sound pictures, has been honored as a Fellow of the American Institute of Electrical Engineers. AIEE is the world's largest engineering society, with a membership exceeding 50,000. The grade of Fellow is the institute's highest award. Citation for Hill is "for contributions to the development of wire and radio communications, sound motion pictures, and acoustical technology."

A native of England, Hill came to this country in 1922 to become transmission engineer in the plant department of the Southern California Telephone Company, where he made major contributions to radio communication, broadcasting, program facilities, and public address system design and application.

This led him to work on sound movies as a recording engineer with Electrical Research Products, Inc., a subsidiary of Western Electric. In 1936 he was appointed transmission engineer in the chief engineer's department of the Southern California Telephone Company (now the Pacific Telephone and Telegraph Co.)

Presently retired, Hill is a member of the Academy of Motion Picture Arts and Sciences, and has long been active in the AIEE Los Angeles section, serving as a member of the executive committee, secretary, vice-chairman, and chairman.

## SCIENCE NOTES

Metal Finishers that will have maximum hardness, much greater impact and chemical resistance than conventional finishes will be obtained from two fast-curing surface coating resins, Cyzac 1006 and 1007, American Cynamid Co. announces.

* * *

A Better Battery with 63 times greater potential voltage and 10 times longer storage life has been developed by General Electric. A "solid electrolyte" type, the battery is expected to be useful both in a one-shot device where energy is stored in a capacitor, or where long periods of disuse require a source having a long storage life. At 70° F. it can be stored 20 years, and at 165° F. it will last 720 hours.

* * *

Remote Speaker Controls may now have more compact housings or outlet boxes, due to production of three new constant impedance attentuators developed by Clarostat Manufacturing Company. Instead of the larger units in present use, the new CIT43 controls are based on the 1⅛-inch diameter potentiometers. Rated at 2 w DC, the controls handle up to 4 w of audio.

* * *

Arc resistance of phenolic insulation materials has been improved by as much as 1,000%, according to Westinghouse. Resistance is achieved by separating molecules of the resin with particles of inert oxides such as silica and alumina. The oxides keep the resins from breaking down into conduction compounds under strong electrical discharge.

## NEWS FROM DISTRICT 2

(*Continued from page* 20)

Frank Smith, president of Hemet Local 707, reported that Warner Brothers had purchased 3000 acres of land between the cities of Beaumont and Banning, and that there were rumors of plans for a new drive-in theatre. The Local hopes to sign up the Desi-Lou shows in Palm Springs, and is still dickering with Charles Farrell there.

Representing Barstow Local 730, Charles Hall reported a three-year agreement with the Lancaster Drive-In calling for increases of 15 cents, 10 cents, and 10 cents-per-hour, bringing the wage scale the third year up to $3.15 per hour.

Marvin Barker, business representative for Local 761, Chula Vista reported new two-year contracts with wage increases of 15 cents and 10 cents per hour, plus health and welfare plan benefits.

The Council's health and welfare committee took up the problem of increased hospital charges and discussed ways and means of giving the members full protection without increasing the premiums.

Before the close of the meeting, Local 150's George Schaffer called the delegates' attention to the endorsement of paid TV by the Studio Council. Speaking for his Local, Schaffer strenuously objected to this endorsement and he requested that all IA Projectionist Locals get together and block the resolution at the forthcoming California State AF of L Convention.

Adding a note of humor to the meeting, Lon Bennett, Council secretary, requested permission to discard the 16-year-old briefcase he was using and purchase a new one. Permission was unanimously granted and IA representative George Flaherty urged the secretary to make every effort to obtain the maximum trade-in value of the old briefcase.

And so ended the District No. 2 Council meeting—and today ends my vacation here at Clear Lake. Tonight we break camp and head for home where yours truly is looking forward to warmer nights and inner-spring mattresses. Sleeping bags are fine—BUT!

## EQUIPMENT IN ARMY AND AIR FORCE THEATRES

(*Continued from page* 17)

tribution rendered curvature unnecessary though, generally, it was advantageous.

While wood frames could be used, it was found from experience that they were heavy, subject to gradual changes in form and generally less desirable than metal, except in the smaller sizes. Almost all the frames were constructed of metal tubing.

Image brightness was another factor that required investigation in connection with screens and lamps. It was desired to operate within the recognized 9 to 14 foot-lamberts limits. With white screens this represents no very great problem, since proper choice of lamps and arc current usually suffices, but it is far less simple with silver screens. Regardless of how the frame may be curved or tilted, it is impossible to achieve uniform brightness throughout the auditorium. The image will be brighter when viewed from the center of the seating area than from the sides, and it very likely to be above the desired value at one point and below at another. This condition can be alleviated by the use of lenticulated or semi-diffusive surfaces, but the greater cost may not always be justified.

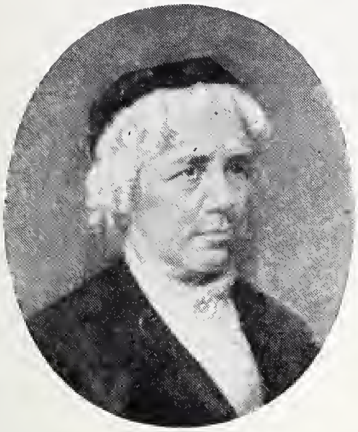
For economic reasons, use of white screens with larger lamps was not favored, although technically this is an excellent solution. For the same reason, although a considerable number of lenticulated screens were purchased, general use of this type could not be considered.

Fortunately, close adherence to the 9 to 14 foot-lambert recommendation is not essential. A brightness of 20 foot-lamberts has been recommended by some, and even somewhat higher brightnesses can be used without introducing really excessive flicker and without serious degradation of contrast. Consequently, it was decided to accept higher values at the auditorium center in order to avoid undesirably low levels elsewhere. This had the advantage that lower-gain screens, with broader light-distribution characteristics, could be substituted as they became available, with an overall improvement in viewing conditions.

The lamps already in use were of two types: 1-kw lamps in the smaller theatres, and simplified high-intensity (using 7-mm and 8-mm Suprex carbons) in the larger. These were adequate since the largest screens were under 40 feet in width and could be illuminated within the desired limits without difficulty.

Had the theatres required larger images, larger lamps would have been procured. This was done for some overseas theatres, whose great size required larger images, and larger lamps are planned for a theatre now being designed. As it was, except for some transfers of existing lamps and power supplies or a change in carbon size, little new equipment proved necessary.

**[TO BE CONTINUED]**



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That was because they didn't know Maria Mitchell. At 12 she could regulate a ship's chronometer; at 17 she understood Bowditch's "Practical Navigator" and was studying science in self-taught French, German and Latin. In time she would become the first woman member of the American Academy of Arts and Sciences, the first woman astronomy professor—in Matthew Vassar's Female College—and a member forever of New York University's Hall of Fame.

Moreover, all her adult life she was to work with growing success in the crusade to make American women free.

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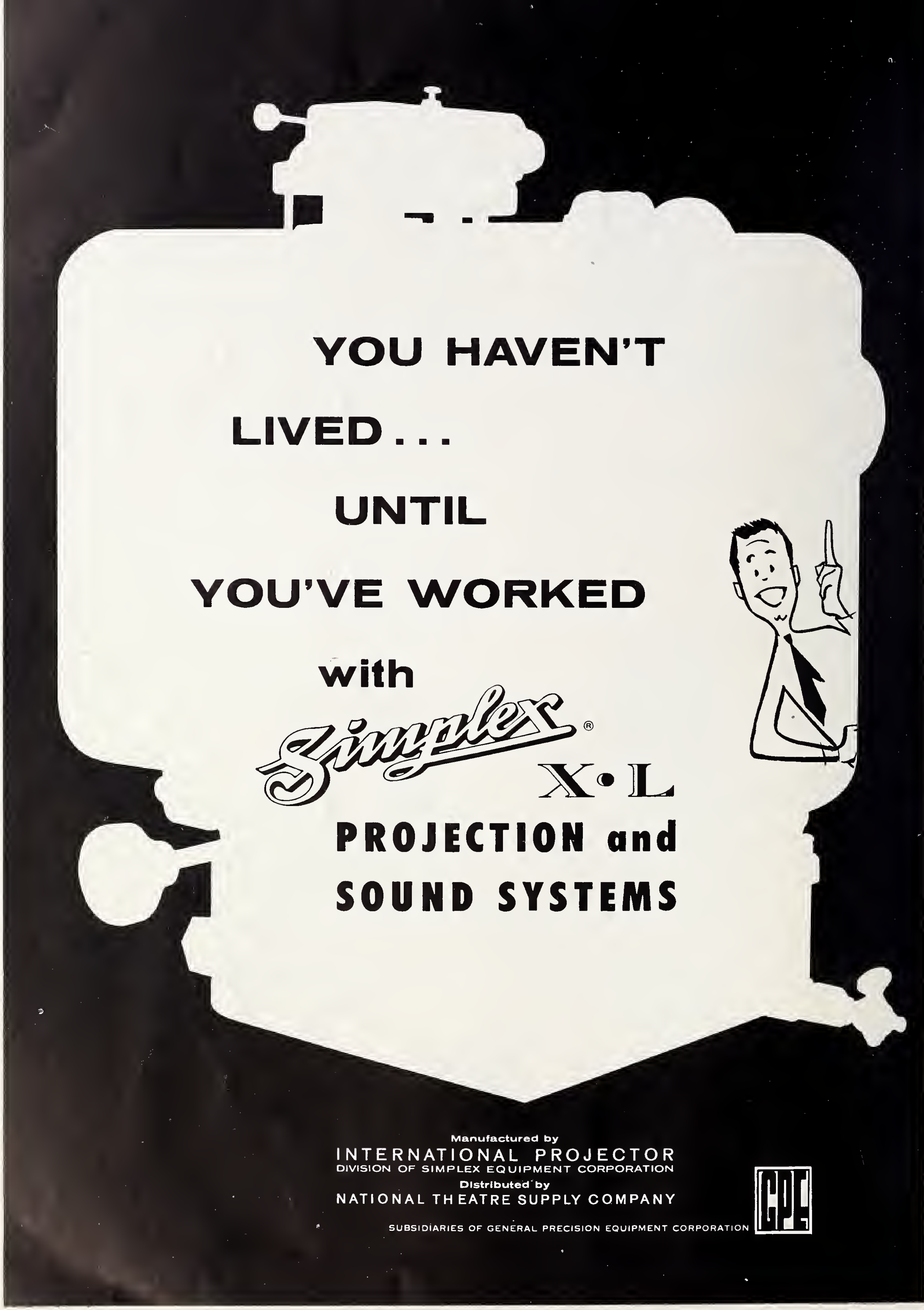
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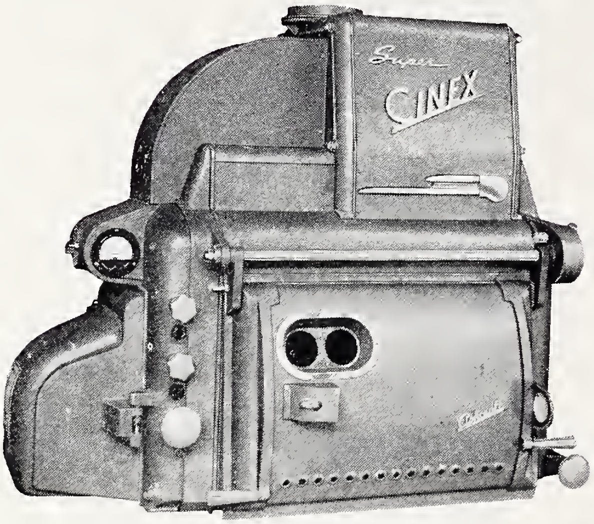


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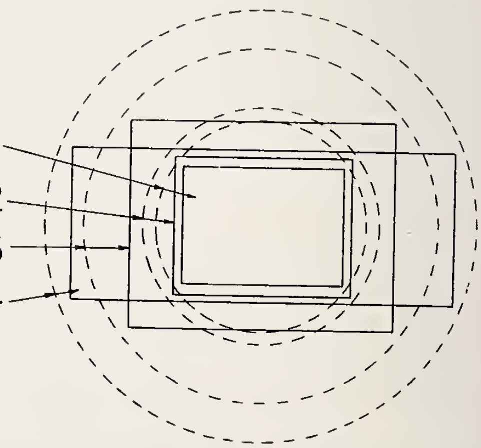

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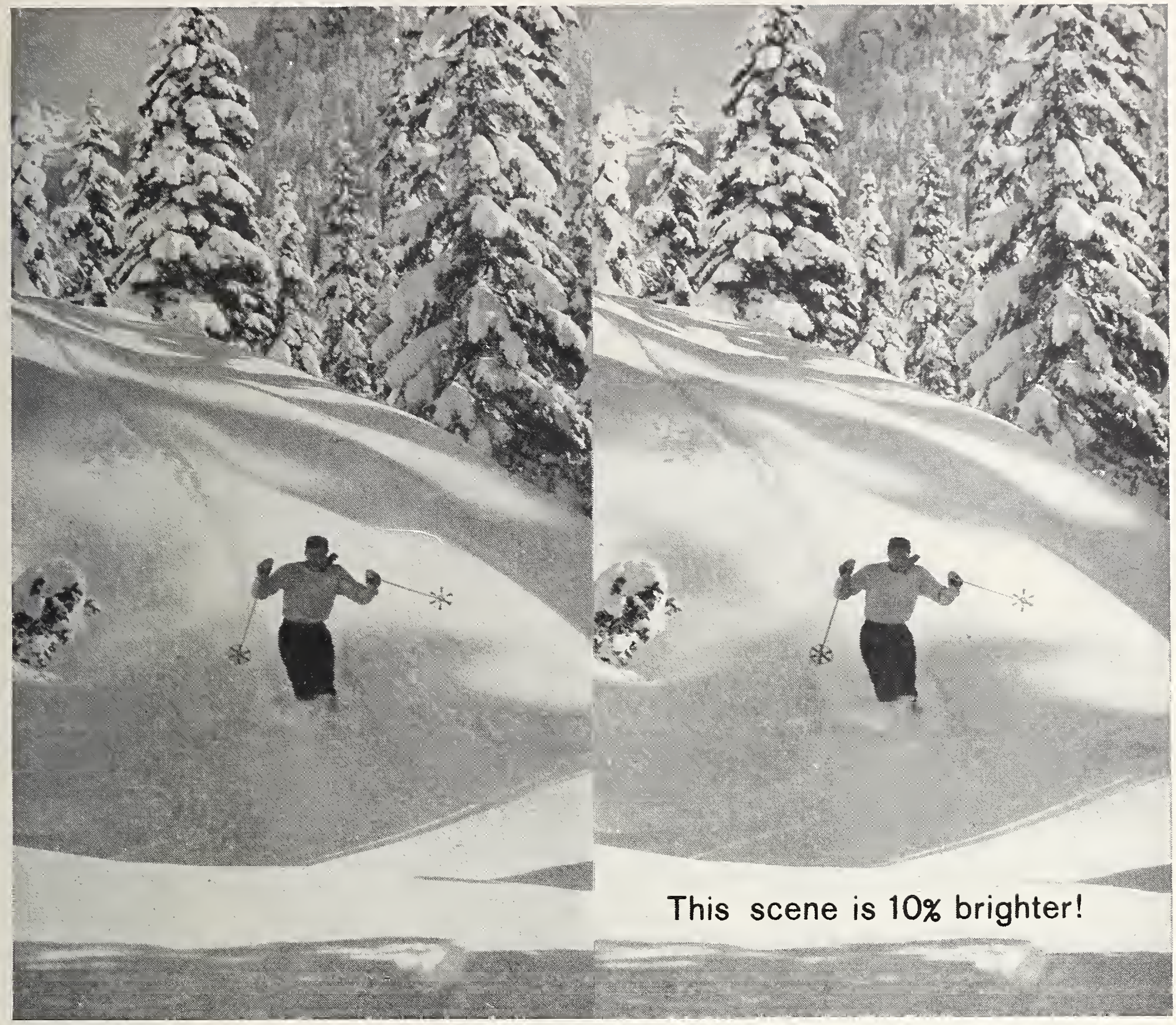


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# International PROJECTIONIST

R. A. ENTRACHT, *Publisher*
ROBERT C. MacLEOD, *Editor*
R. A. MITCHELL, *Contributing Editor*

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# Monthly Chat

## "Now We Are Engaged In A Great Civil War . . ."

WE TRUST that our readers will recognize that title as an excerpt from Lincoln's Gettysburg Address; it was delivered 94 years ago this month. The Civil War was probably the bloodiest in history for its size, and probably for two reasons: it was brother against brother, and it marked the change from the antique to the modern.

And now we are engaged in an industrial civil war, brother against brother, throwing off the old and trying anything new. Ever since the motion-picture industry's little brother TV grew up and started throwing his weight around, motion pictures have gone from picnic to panic. And, we regret to say, much of it has been motion picture's own fault. TV isn't that good; it's just that convenient.

We are a civilization of moochers—we will stay up until 2 in the morning to look at a black-and-white postage-stamp reproduction of some off-the-cuff product that was grade C even back in the 30's rather than go out and shell out for something that features good acting, good story, and stunning photography. Because TV is free (so far); because we don't have to drag ourselves out of the armchair (except for a beer).

We have no particular animus against TV. At times it has had great moments. We do not think this magazine has been unfair to it. But we very definitely think that all this intramural hassling, the desperate clutching at anything new, the back-stabbing, and particularly the outrageous lies, have lowered the standards of taste, with a consequent lowering of income—both in TV and motion pictures. And since this is a publication for technicians in that most fragile world, entertainment, we must recognize that if that world collapses, we go with it.

Now that, in publication parlance, is what is known as "scare copy." If a theatre shutters, if a chain folds, if a studio loses money, that's scare copy. Sometimes we print it, sometimes we don't depending on its pertinence and importance. But theatres *do* shutter, chains *do* fold, and studios *do* lose money, and sometimes we have to take our lumps like little gentlemen. And the sad part of it all is that it is unnecessary. The public is fickle, but it never stopped wanting to be entertained. And we have the finest equipment in our history to do it.

But we keep horsing around. We can't blame an exhibitor for booking "The Son of the Rock 'n Roll Vampire Returns" if that is what is going to bring them in, but we can't help thinking there is a better answer. Just what that answer may be is not in our province to conjecture. This is a technical magazine for projectionists, and they have been busy enough in the past few years coping with each new "answer" that came along. (You count the processes, we've lost track.) But the projectionist is a hardy soul, and has to be. He probably gets that way from constant exposure. If you see, say, "The Pride and the Passion" once, it's an entertaining adventure. If you have to look at it every day, it's just two hours of lugging a

(*Continued on page* 34)

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Volume 32 NOVEMBER 1957 Number 11

AN IP EXCLUSIVE:

# Projection With Hi-Speed Intermittents

By ROBERT A. MITCHELL

**The 5-to-1 movement has long been touted as an answer to the problem of increased screen light; now the Simplex Equipment Corp. announces a successful, field-tested 5-to-1 intermittent. Robert A. Mitchell presents his own on-the-spot observations.**

THE THEORETICAL advantages of the "five-to-one" intermittent movements for professional 35-mm projectors are well known to the readers of IP. A brief résumé of the various types of high-speed movement discussed by José Ruiz and other writers was published in the August 1957 issue of IP (p. 7 *et seq.*).

Conventional intermittent movements for theatre projectors have a 3-to-1 dwell-to-pulldown ratio; that is, they allow the film to remain stationary over the aperture 3 times as long as the interval of film pulldown from one frame to the next. This type of movement requires a 90-degree shutter blade to "occult" the film during the actual pulldown to prevent the picture from being marred by flickering streaks of light known as "travel ghost." But because a shutter cutoff-frequency of only 24 cycles per second would cause the projected picture to flicker violently, a second 90-degree blade is required for the purpose of increasing the cutoff rate to 48 each second.

It is absolutely necessary, in any projector shutter, to have equal angular widths of blades and openings.

A projector shutter having two 90° blades cuts off and wastes 50% of the light and transmits 50%, the total maximum light transmission without travel ghost or image trembling when ordinary 3-to-1 intermittents are used. Why not make the film pulldowns more rapid therefore, in order to provide longer dwell periods and permit narrower shutter blades to be used for increased screen light? This has actually been done with more or less success in several makes of projector, the dwell-to-pulldown ratio usually being 5-to-1.

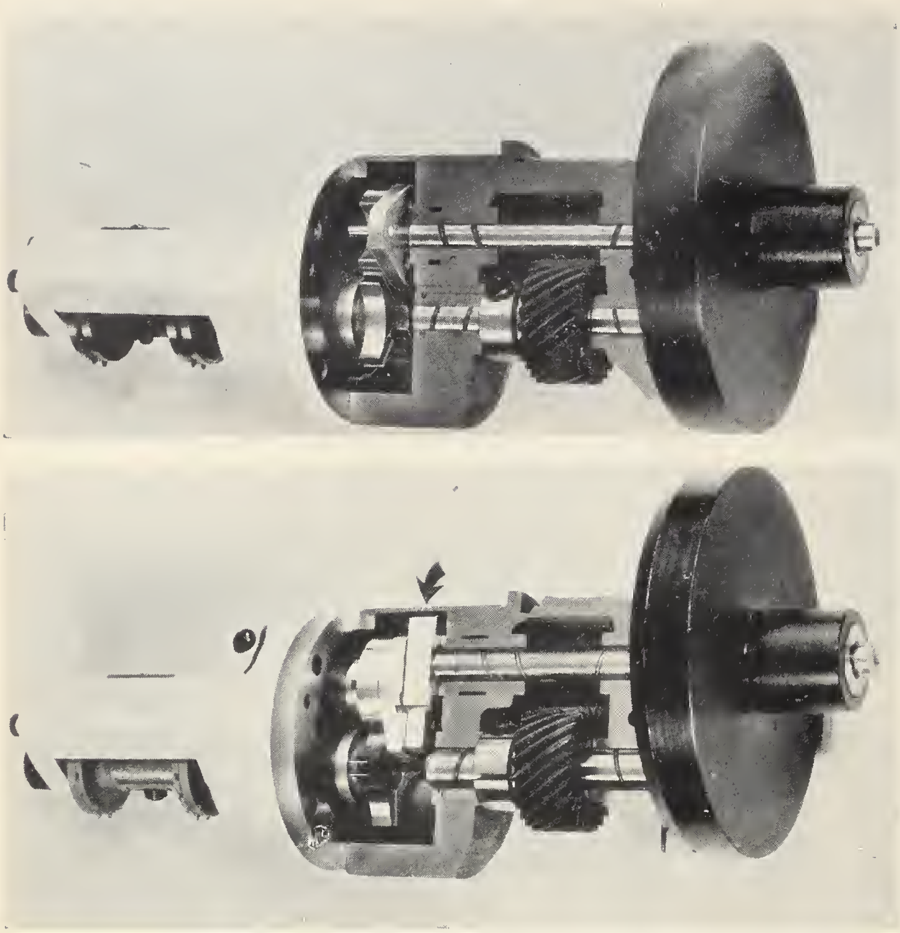
### *Commercial 5-to-1 Intermittents*

Use of 5-to-1 intermittents in 16-mm projectors is practically universal. The old Powers 35-mm theatre projector employed a 5-to-1 movement of ingenious design. A modern French projector, the Radion II, has a standard geneva movement which is accelerated to a ratio of about 4-to-1. While this ratio is not quite great enough to offer all the possible advantages of a faster-than-standard intermittent, the mechanical principles of the accelerator are very satisfactory, and have been extensively investigated with a view to commercial adaptation by two American projector manufacturers, Motiograph, Inc., and the Simplex Equipment Corporation. To Simplex goes the honor of being the first to improve and introduce for theatre use an accelerated geneva movement having a full 5-to-1 operating ratio.

The new Simplex "Hi-Speed" intermittent, designed and manufactured for use in Simplex X-L projectors, has been thoroughly tested in the laboratory and in the field under actual projection-room conditions. The Hi-Speed movement is a sturdy precision unit which has proved itself to be as dependable, smooth-running, and rock-steady in operation as the standard 3-to-1 X-L geneva intermittent. In fact, the new 5-to-1 Hi-Speed movement resembles the standard X-L movement, with which it is interchangeable, except for the addition of a compact pinwheel accelerator located inside the intermittent housing.

Before discussing its performance characteristics and the benefits accruing from its use, let's see how the Simplex X-L Hi-Speed movement works.

As shown in Fig. 1, the Hi-Speed intermittent is essentially a conventional geneva movement with the same type of pinwheel ("cam") and starwheel familiar to all projectionists. These two components, by themselves,



Cross-section views of the regular 3-to-1 (top) and the new 5-to-1 (bottom) Hi-Speed Simplex X-L intermittent movements. The slipper-block which drives and periodically accelerates and decelerates the pinwheel ("cam") *via* the "outer pin" is clearly visible (arrow) in the photograph of the Hi-Speed movement. (Pins on the pinwheel at their greatest distance from the drivewheel shaft when the geneva star is being driven.) Note that these two geneva movements are interchangeable so that all users of Simplex X-L projectors may have the advantages of Hi-Speed intermittents.

work in exactly the same way as the pinwheel and star of the standard 3-to-1 X-L movement.

The pinwheel, however, has a pin that protrudes from *both sides* of the pinwheel flange. The pin on the starwheel side functions in the usual way, entering a starwheel slot and turning the starwheel and sprocket one-quarter of the way around at each revolution of the pinwheel. The protrusion of pin on the side of the flange *opposite the starwheel* serves to drive the pinwheel, itself, in a very special way.

The outer pin fits into a hole near the end of a "slipper-block"; and the slipper-block lies in a wide groove in a revolving "driver-wheel." The slipper-block is free to slide back and forth in this groove when the movement is in operation.

We have now made the acquaintance of three unusual components, outer pin, slipper-block, and driver-wheel having a recess in which the slipper-block may slide.

Note in Fig. 1, that the pinwheel shaft and driver-wheel shaft do not lie on the same line, but are *displaced* by a certain distance. This displacement forces the slipper-block to slide back and forth in its groove at each revolution of the driver-wheel.

Reference to the drawing will show that the pins of the pinwheel are at *their greatest distance* from the driver-wheel shaft when the geneva star is being driven. The pinwheel is thus speeded up during the pulldown intervals. Conversely, the pins are at *their least distance* from the driver-wheel shaft during the dwell periods when starwheel and sprocket are "at rest." The pinwheel is then turning at its slowest rate, prolonging the dwell interval.

Successive acceleration and deceleration of the pinwheel is repeated at each revolution; and inasmuch as the displacement of the driver-wheel and pinwheel shafts is such that the dwell intervals last 5 times longer than the pulldown intervals, the Simplex Hi-Speed intermittent is a 5-to-1 movement.

The Powers projector, now obsolete, also employed a 5-to-1 intermittent movement, and one which was popular with projectionists. But the Powers intermittent was not of the geneva type, but a pin-cross movement having a cam-ring which effected a quarter turn in a 4-pin "cross" at each revolution. This serviceable device was very difficult to manufacture to close tolerances, however; and wear of the pins often introduced the same 6-cycle "dancing" of the picture which is seen when a lop-sided sprocket is used with any intermittent. Good as it was in its day, the Powers pin-cross intermittent was seldom as rocksteady as a well-made geneva movement.

### *Other High-Speed Movements*

Another interesting high-speed intermittent is the "eccentric-star" geneva movement having non-radial starwheel slots. This movement has the gradual sprocket-acceleration characteristics of a conventional geneva movement, but the deceleration is so rapid that the sprocket virtually comes to a sudden dead stop instead of decelerating gradually. This causes the film to overshoot on the sprocket and give extremely jumpy pictures on the screen.

Two other types of high-speed sprocket movement are entirely feasible, however. These are the oscillating-pinwheel geneva movement (which effects a pulldown at *every other* revolution of the in-and-out oscillating pinwheel) and the drunk-cam movements which exist in wide variety. These interesting movements have been successfully used in 16-mm and television projectors; and there are no serious engineering objections to their use in professional 35-mm machines.

Choice of the accelerated geneva intermittent for the Simplex X-L was dictated largely by its silent, rocksteady, trouble-free operating characteristics and the need for interchangeability.

So great and various are the advantages provided by the Simplex Hi-Speed movement, that commercial introduction of the new unit may well be hailed as a milestone in projection technology. It makes possible brighter pictures without increasing shutter-flicker. It improves the definition of the

projected image in nearly all cases—an important consideration in wide-screen projection—and it may effect substantial savings in carbons, current, and arc-lamp replacement parts. Each of these benefits merits detailed explanation.

### *Relative Shutter Efficiencies*

The increased picture brightness made possible by 5-to-1 intermittents is the direct result of higher light transmission of the narrow-blade shutters which may, and should, be used with them.

Conventional 3-to-1 intermittents, as we pointed out, require shutters having 90° blades and 90° openings. These waste one-half of the light, or even more, depending upon the location, diameter, and rotational speed of the shutter. High-speed 5-to-1 intermittents, on the other hand, require shutter blades only about 60° in angular width. Shutters having 60° blades and 120° openings transmit 1.333+ times more light to the screen than the maximum amount of light possible without travel ghost when ordinary intermittents and shutters are employed.

Stated another way, 3-to-1 intermittent-and-shutter systems have, at most, only about 75% of the illumination efficiency of 5-to-1 systems. But these values were calculated from *theory*. What do actual tests reveal about the increased illumination efficiency of the new Simplex X-L Hi-Speed intermittent?

The standard 3-to-1 X-L cone shutter has two 90° blades (90° openings). The 2-blade cone shutter supplied with the new 5-to-1 Hi-Speed movement has two 63° blades (117° openings). As light-meter tests show, the narrow-blade shutter gives 130% the light transmitted by the conventional wide-blade shutter.

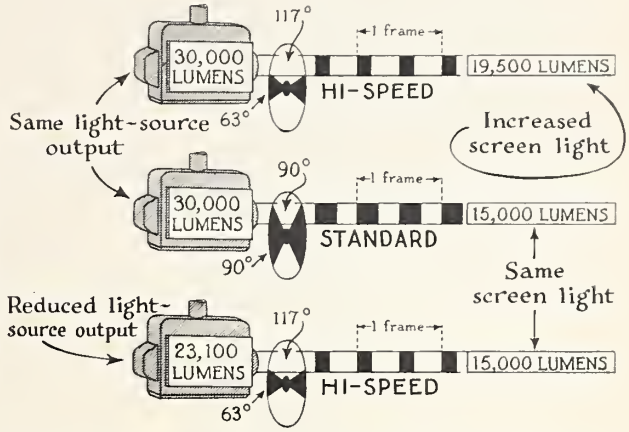



FIG. 2. Advantages of the Simplex Hi-Speed movement used with a 63-degree 2-blade shutter. As indicated diagrammatically, the new intermittent gives a picture 1.3 times brighter than the picture obtained with a conventional movement used with a 90-degree shutter, lamp lumen output remaining the same.

Fig. 2 illustrates the light-increase of the Simplex Hi-Speed 5-to-1 system diagrammatically. An arc lamp capable of providing 30,000 screen lumens without the shutter running gives only 15,000 screen lumens when the projector, fitted with a 3-to-1 90° 2-blade shutter, is run without film. The light is cut exactly in half.

With a 5-to-1 Hi-Speed intermittent and a 63° 2-blade shutter, on the other hand, screen light amounts to 19,500 lumens when the projector is run without film—an increase of 4,500 lumens!

Certain of the smaller theatres already have a sufficiently high level of screen light. If the prevailing light flux is 15,000 lumens with a lamp rated at 30,000 lumens, installation of Hi-Speed movements permits the light-source output to be reduced to 23,100 lumens, 77% of the former output, to obtain *the same* 15,000-lumen light flux!

Maintaining a previous *satisfactory* screen-light level by using Hi-Speed intermittents and reducing the light-source output by 33% not only slashes carbon and current bills, but prolongs the life of the arc lamps with less frequent mirror and carbon-holder replacements. From the point of view of the projectionist, less heat in the lamp makes for easier, more consistent operation, and less heat on the film reduces in-and-out of focus flutter to give a sharper focus on the screen. Audiences appreciate the clearer pictures.

This writer recommends taking advantage of increased screen light with 5-to-1 intermittents in theatres where the present screen brightness is below 15 or 20 footlamberts, however. Most medium-size and large theatres, as well as all drive-ins, are in serious need of the extra light made possible by the new Simplex X-L Hi-Speed movement and 63° shutter.

### *Solution of Flicker Problem*

Conventional projection is troubled by a flickering perceptible in the bright highlight areas of the picture—bright clouds, buildings, snow, etc.—and the flickering becomes worse when it is viewed out of the "corner of the eye" (peripheral vision). This projection defect is caused by the standard shut-

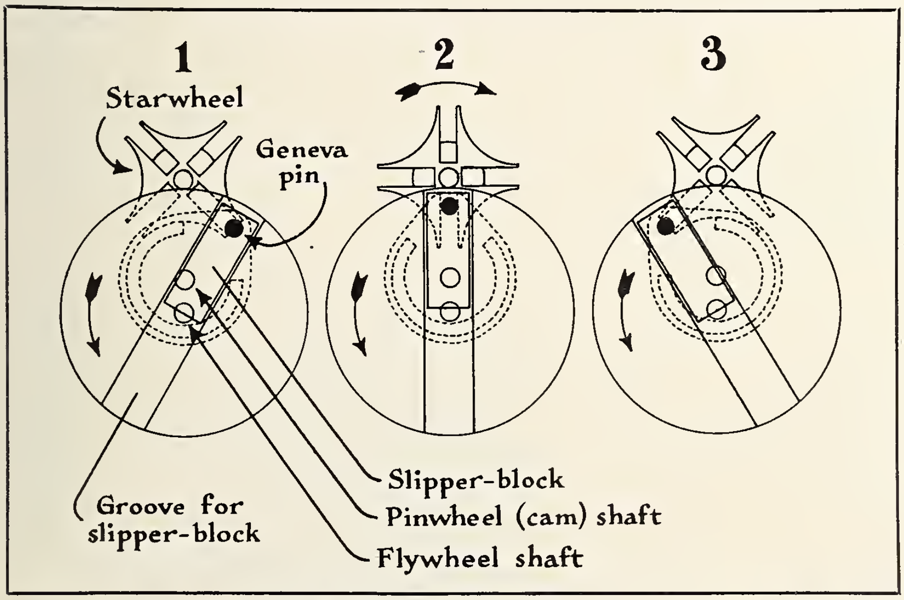



FIG. 1. How the Simplex X-L Hi-Speed accelerated geneva 5-to-1 intermittent works. By displacing the driver-wheel and pinwheel shafts, the slipper-block slides at each revolution of the driver-wheel and the pinwheel undergoes the desired periodic accelerations and decelerations, the amount of displacement effecting a 5-to-1 ratio. Driver-wheel shaft is constant-speed.

ter cutoff-frequency of 48 cycles per second, a frequency which is too low to permit absolutely flickerless projection when light levels are sufficiently high and when wide screens involve peripheral vision. It is a well-known fact that flicker does not cease until the shutter cutoff-frequency approaches 60 cycles per second.

Use with the Simplex Hi-Speed intermittent of a shutter having *three* equidistant 60° blades increases the cutoff frequency to 72 cycles/second, a rate which is well above the limit of flicker perception. Screen illumination appears constant with a 3-blade shutter, no matter how bright the light.

### *Film Behavior in Gate*

The peculiar behavior of film in the projector gate nevertheless precludes the use of 3-blade rear shutters at arc currents much over 80 amperes (15,000 lumens measured *without* the shutter). The reason why 3-blade rear shutters give trouble at high arc currents can best be understood by considering the complex changes in position which each film-frame undergoes when it comes over the aperture and receives 2 or 3 rapid blasts of intensely hot radiation.

Film normally enters the projector gate with a slight "positive buckle," bulging toward the lens. When no rear shutter is used, as shown in the top panel of Fig. 3, the heat-absorbing emulsion begins to expand relative to the film base the moment arc radiation strikes it. Buckle then changes from positive to negative, with the center of the film-frame moving toward the lamp.

Taking 0.003 of an inch as the depth of focus of the average lens, the length of time during which each film-frame remains in focus in old-style front-shutter mechanisms is comparatively long.

Projectors having conventional 90° 2-blade *rear* shutters on the other hand, are troubled at high arc currents by the flutter induced by the mid-dwell "balancing" cutoff. When this cutoff occurs, the emulsion loses some of the heat it previously absorbed, and the film-frame begins to recede toward the zero plane of flatness. But when the second flashing interval begins, the film again buckles toward the lamp, making focus difficult to sharpen satisfactorily. The projectionist can do no more than select a "best average focus" for a minimum of blurring under these difficult conditions.

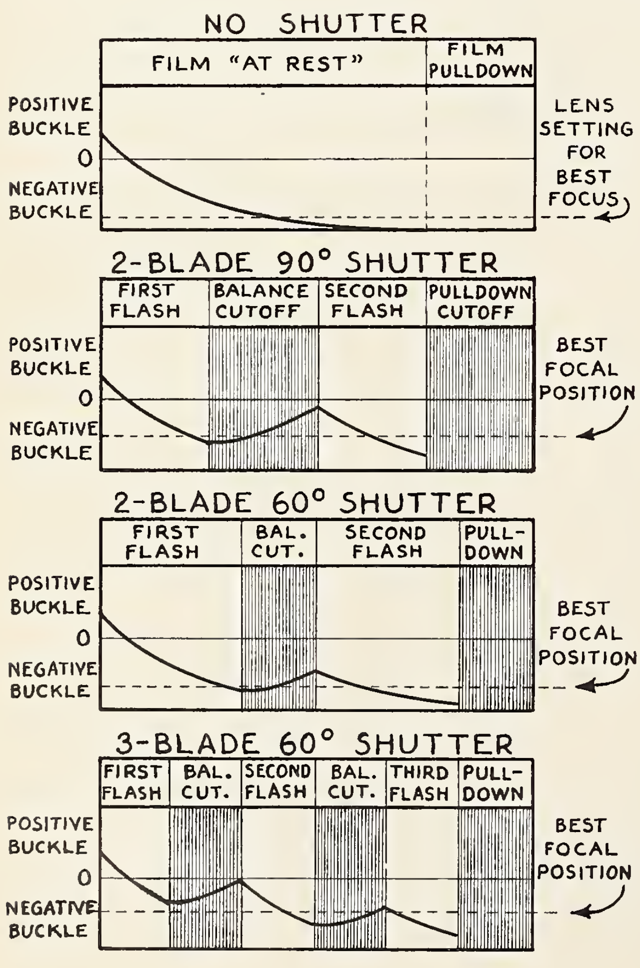



FIG. 3. Film behavior in the gate. Film normally enters the projector gate with a slight "positive buckle" bulging toward the lens. Emulsion begins to expand relative to the film base the moment arc radiation impinges upon the film, buckling negatively toward the lamp.

This in-and-out fluttering of film in the projector gate has been intensively studied by Willy Borberg of the General Precision Laboratory. (See "Modulated Air Blast for Reducing Film Buckle" in IP for October 1952, p. 14 *et seq.*)

A 60° 2-blade shutter produces a film-flutter effect somewhat similar to that produced by a conventional shutter, but the narrower blades prolong the intervals of irradiation and allow the film to approach more closely an equilibrium value of negative buckle. The film accordingly moves only a very little during the second flashing interval, facilitating a sharp focus on the screen.

The 3-blade shutter, unfortunately, produces several in-and-out of focus movements of the film, as shown in the bottom panel of Fig. 3. These movements exceed the depth-of-focus range of the average lens at high arc currents and prevent a sharp focus from being obtained. For this reason the use of 3-blade shutters with arc currents greater than about 80 amperes (according to the writer's determination) is not recommended, even though 3-blade cone shutters are available for the Simplex X-L.

Below 80 amperes (90 amps. with heat filters), and in theatres having small, brightly illuminated screens, the 60° 3-blade shutter and the 5-to-1 Hi-Speed intermittent make possible the complete elimination of shutter-flicker from motion pictures. Screen brightness with 60° 3-blade shutters and 5-to-1 intermittents is the same as with 90° 2-blade shutters and 3-to-1 intermittents.

### *Narrow Blades Decrease Flicker*

Fortunately, no increase in flicker results from the use of 63° *2-blade* shutters with Simplex X-L Hi-Speed intermittents. It has been determined experimentally that the wider the shutter openings relative to the width of the blades, the less is the perception of flicker. This remarkable fact indicates that the extra screen light obtained with high-speed intermittents and narrow-blade shutters does not necessarily increase flicker.

With 90° shutter blades and a cutoff frequency of 48 cycles per second,

(*Continued on page* 33)

# Panavision Enters Independent Production

**The manufacturers of anamorphic camera lenses now turn to films that can be shown 35-, 65-, or 70-mm employing a 3-to-1 ratio.**

PANAVISION, INC., makers of anamorphic camera lenses, printing lenses for various widefilm processes, variable anamorphic projection lenses, the Panavision-Simplex projector conversion for 70-mm, and various other products in the industry, has announced the formation of Panavision Films, a new independent production company.

In a press interview, Robert E. Gottschalk, president of Panavision, Inc., and vice-president in charge of production for the new firm, said that the features will be roadshown on Panavision's 65-70-mm process. The first production will be "The Magnificent Matriarch," based on the Kathleen Mellen novel dealing with Hawaiian history. Producer will be David Lewis, who did "Raintree County" (which was shot in Panavision's 65-mm process, but released in 35-mm). The budget on the picture, which is set to roll next May, will be $2,000,000.

Besides producing the picture, Panavision will offer a package deal to exhibitors which will include projector, lamps, lenses, screens, etc., on a rental or lease purchase basis, determined by revenue and seating capacity.

### *Package Equipment*

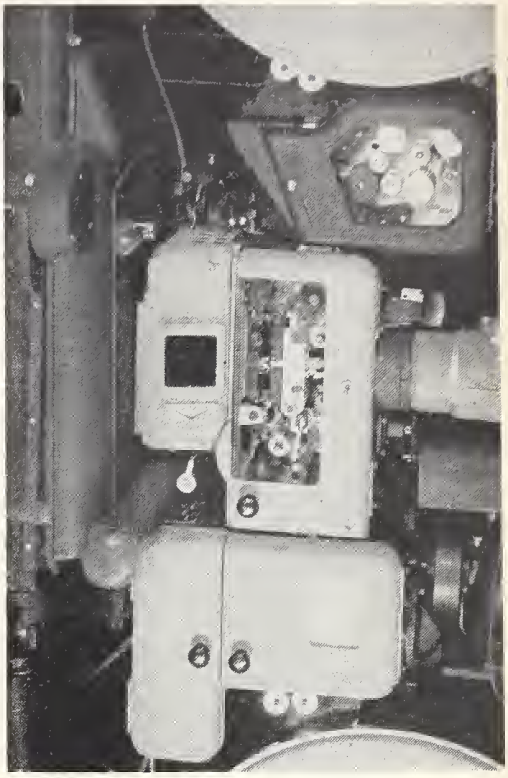
The equipment in the package will consist of Ashcraft Super Cinex lamps, modified Simplex projectors, the Panavision slight-squeeze lens, and a screen especially developed for the process by Radiant Manufacturing Corp.—nonmetallic, smooth, a newly-developed surfacing, modified gains of 2, 2½, and 3-to-1, and, most important, a 3-to-1 aspect ratio.

It was this 3-to-1 ratio that caused the most discussion in Gottschalk's New York interview. He is adamant that 60 feet is the minimum width for the screen. "Otherwise, we won't install our process," he said.

Gottschalk is certain that the 3-to-1 ratio will not disconcert an audience, but rather will enhance the picture—which will include location shots in Hawaii, a volcano eruption, and authentic underwater scenes shot with a special 20-pound hand camera.

### *Definitely Not Cinerama*

"This is definitely not Cinerama," he said. "We're only going to use a very slightly curved screen, and probably in some cases none at all." This, Gottschalk believes, will get away from the 'bent' look that images tend to on curved screens. "And contrary to popular belief, there are many theatres capable of handling very large screens," he added. Those theatres already equipped to handle 70-mm (like Todd-AO houses) will only have to install the Panavision wide screen and projection lenses. As it stands, minus the Todd circuit, there is a potential of some 20 theatres. In some cases, the screen can be set up in front of the proscenium.

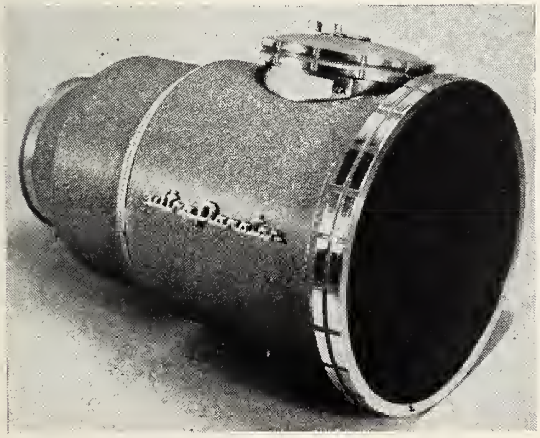


Panavision-Simplex Conversion which allows projection in 35-, 65-, or 70-mm. Included in this conversion of standard Simplex XL projectors are a 3-wing shutter, double duty drive and intermittent sprockets, 65- and 70-mm film gates, and a specially-designed magnetic sound reproducer by Magnasyne of Burbank, Calif., that will reproduce 6-channel magnetic sound on 70-mm prints, and 4-channel or single-channel magnetic sound on 35-mm. Changing in the projection room is said to take from 3 to 5 minutes.

"The Magnificent Matriarch," which will be three hours long and in Eastman Color, will be roadshown for one year in 70-mm in key cities throughout the world, and then will be put into general 35-mm release. The Panavision-Simplex projector conversion is capable of showing 35-, 65-, or 70-mm film. With the package deal of screen, etc., they are expected to cost around $6000. Gottschalk believes that many exhibitors will elect to keep the equipment.

The production, of course, will be shot in the Panavision 65-mm process, also known as MGM Camera 65. Panavision developed the process in cooperation with the MGM Research and Development department. It now has 6 modified Mitchell 65-mm cameras in production. MGM has 13. A three-strip release print of the Cinerama type has also been developed.

The 70-mm release print of the initial picture will probably carry six sound tracks.



The Ultra Panatar 35-mm variable anamorphic projection lens used in conjunction with the Panavision-Simplex Conversion. Available also is the Panatar 16, designed for 16-mm variable anamorphic projection.

**Some comments this month on varied attempts at projection lamps other than carbon arcs, and a view of TV projection.**

# From the British Viewpoint

By R. HOWARD CRICKS

FOR MANY YEARS attempts have been made to supersede the carbon arc by some form of enclosed discharge lamp. Before the war Philips went so far as to build a projector around their tiny water-cooled mercury lamp. This lamp, with a discharge only 12.5-mm in length and 1.8-mm in diameter, consumed 1000 watts at 500 volts, and in use built up an internal pressure of 100 atmospheres (although since its bulk was so small this pressure constituted no danger). The lamp was built inside a water-jacket.

The light output was 60,000 lumens. The source consisted of a thin line of light, and in order to cover the picture aperture, an ingenious reflector consisting of several cylindrically curved faces reflected the light to the desired angle.

The twin projector built around this lamp was a fine piece of engineering. One projector head was mounted above the other; the lamphouses were, of course, so small that they were simply built on behind the gates; spool boxes came where one would expect to see the lamphouses, and the sound amplifiers were built into the stand.

The projector had only one fault: it was quite unsuitable for showing colored films. Although the high working pressure added a small amount of red to the light, the cold light of the mercury discharge killed any red in the film, and London's buses and pillar-boxes appeared a dingy brown. Attempts to overcome this fault were evidently unsuccessful, for we saw no more of this fine effort.

## COMPACT SOURCE LAMPS

Then came the compact source mercury lamp, in which the discharge took place between electrodes enclosed in a quartz bulb. The discharge was pear-shaped, and if not optically ideal for projection was quite acceptable.

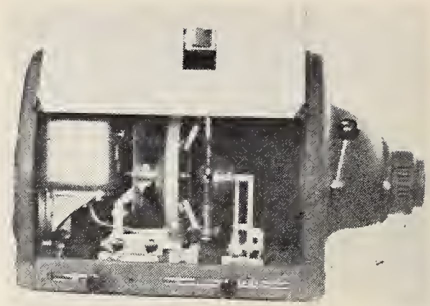
The compact source lamp was made by the British Thomson-Houston Co. in various sizes up to several kilowatts, for both studio lighting and projection. The vapor pressure when burning was 40 to 80 atmospheres; due to this high pressure, the lamp once extinguished would not re-strike until it had cooled down. A circuit was therefore provided for "simmering" it between takes or between reels. A miniature version of this lamp, rated at 250 watts, is occasionally used for 16-mm projection.

Unfortunately the light still has the typical color of the mercury discharge. Even the admixture of cadmium to mercury filling does not altogether correct the color of the light, and while it is perfectly acceptable for black-and-white projection—better in fact than the filament lamp—it is not good enough for showing colored films.

## THE XENON LAMP

Mercury is a liquid, and its vapor is not a true gas. Experiments have been made with numerous gases, of which argon and xenon have been found most suitable.

So far as Europe was concerned, I believe the first successful results were demonstrated by the British Siemens Company. But the first commercial application of the xenon lamp to motion picture projection must be credited to the German firms of Osram and Zeiss-Ikon.



**Zeiss-Ikon Ikosol II lamphouse with 1800-watt xenon lamp. The high-tension striking gear is located behind the mirror.**

From Ted Driscoll, of the Walturdaw Company, British agents for the latter firm, I have received latest details of this lamp, several of which have been experimentally installed by the Army Kinematograph Corporation. It is made in two sizes, 1000 watts and 1800 watts, the former with a screw cap and the latter with a bipost mounting. Because light is radiated in all directions, a small mirror in front of the lamp reflects light back into the main mirror, which re-reflects it to the gate.

The characteristics of the two types are shown in the table. On a matte screen the light outputs are reckoned to be adequate for screen widths of 14 feet and 19 feet, respectively, on a normal screen, or 19 feet and 27 feet for CinemaScope.

A high-voltage discharge is necessary to ignite the lamp. If this discharge were operated while the sound equipment was in action, it would make an audible noise in the speakers. When I saw the lamp a year ago at the Photokina, Cologne, the idea was that it should be under-run on a so-called closed-circuit system between reels; but in the new model the circuit is so arranged that the sound is short-cir-

### XENON BULBS

| | XBO 1001 | XBO 2001 |
|---|---|---|
| Max. lamp current | 45 amps. | 70 amps. |
| Arc voltage | approx. 22 v. | approx. 26 v. |
| Consumption | " 1000 watts | " 1800 watts |
| *Luminous flux:* | | |
| at full load | approx. 3000 lm. | approx. 5000 lm. |
| Useful flux | " 2400 " | " 4000 " |
| Initial amperage | " 38 amps. | " 60 amps. |
| *Mean useful life:* | | |
| Without closed-circuit | 1200 hours | 1000 hours |
| With " " | 1000 " | 800 " |

cuited for the 1/10th second necessary to ignite the lamp—too brief an interruption to be noticeable.

As with the compact source lamp, the major objection to the xenon lamp is its very high working pressure, of 20 to 30 atmospheres.

### WILL CARBONS BE OBSOLETE?

What advantages would the discharge lamp, if and when it is perfected, offer over the carbon arc? First in my opinion is that once set the lamp needs no further adjustment; unlike the arc, the light output or color cannot be affected by unskilled operation. There are no noxious fumes and no dirt. A much more compact lamphouse can be used provided ventilation is adequate.

A suggestion has been made that the discharge lamp might be pulsed twice for every picture frame, its extinction periods thus obviating the need for a shutter. This would almost halve the current consumption, but would presumably shorten the life of the lamp.

As against these advantages can at present be set first the risk of danger due to the high gas pressure; if the bulb should be dropped on a hard surface it might well explode with lethal results. The efficiency of the lamp drops as it ages, due to burning of the electrodes and blackening of the bulb. So far it shows no advantage over the carbon arc in the matter of running costs.

### SHOWING FILMS ON TV

How do you show a modern film on the tiny screen of a TV set? This is the problem that is agitating many people over here, who fear the effect of showing mutilated versions of films as TV trailers.

So far as I am aware, none of our transmitters are equipped with anamorphic systems to unsqueeze a Cinemacope picture, and anyway only part of the picture frame could be used. Improvements in picture quality mean nothing (the modern 17-in. and 21-in. screens actually degrade picture quality because the British 405-line picture is not fine enough.) So far as color is concerned, all we have seen is a color chart which the BBC transmits after the regular programs have shut down at night.

Twentieth Century-Fox have gone so far as to forbid sequences from "Island in the Sun" to be shown on TV. This is a decision with which I have a lot of sympathy. CinemaScope — VistaVision — Technirama — color — four-track sound: all these achievements of our industry are thrown away if the picture has to be reduced to the TV screen.

Associated with this problem is pay-as-you-view TV. Over here we are watching with keen interest your experiments in piped viewing from the local motion picture theatre into the home. Our cinemas have, of course, not been so badly hit by TV as yours, but there must be 300 or more that have closed down during the past two years: will piped viewing provide the neighborhood exhibitor's salvation?

Ultimately the answer is a matter of the psychology of the buyer—a subject on which I would not dare prophesy. Unquestionably he will get far better program material than at present. But on technical grounds I should be sorry if the customer should prefer to see the latest offerings of Hollywood and London on his own tiny screen, instead of the cinema, where he will see films as they are meant to be seen.

On the other hand, there is one class of film producer who prefers to view his epics as they will be seen later on TV. All our advertising agencies who cannot afford the expense of closed-circuit viewing for their commercials are putting in simulated-TV projection, in which the picture is projected on a tiny screen decked up to look like a TV receiver.

## Projectionist License Exam Questions

WE RECENTLY received a letter from a projectionist who said he missed on one of these questions. We promise not to reveal his name, and we trust it won't happen again. The official exam says 75 per cent is passing, but if you want to make sure you got all of them right, look on page 31.

**1. That quality or property of a lens which causes differently colored lights to come to a focus at varying distances from the optical center of lens is called:**

(a) spherical aberration; (b) chromatic aberration; (c) lens action; (d) refraction.

**2. That property of a lens which separates white light into its primary components is called:**

(a) spherical aberration; (b) chromatic abberation; (c) lens action; (d) refraction.

**3. An enclosed cartridge type fuse may be used on:**

(a) a power circuit only; (b) a 125-volt circuit only; (c) a 250-volt circuit only; (d) any circuit of 250 volts or less.

**4. The polarity of the neutral of an Edison 3-wire DC system may be:**

(a) either positive or negative; (b) neither positive nor negative; (c) positive only; (d) negative only.

**5. Ballast resistors are required when the arc operates on:**

(a) polyphase; (b) pulsating current; (c) a 120-volt DC motor generator set; (d) a lamphouse using an incandescent lamp.

**6. The speed of a synchronous motor depends on the:**

(a) increase or decrease of the load; (b) frequency of the supply line; (c) voltage fluctuations of the line; (d) voltage of the DC excitation.

**7. The function of the filament in a 3-element vacuum tube is to:**

(a) cut down on amount of electricity used; (b) cause the tube to give heat; (c) register amount of electricity used; (d) give off or cause to give off electrons.

**8. The head amplifier amplifies the currents coming from the:**

(a) main amplifier; (b) sound track; (c) exciter lamp; (d) photo electric cell.

**9. The number of inches of film that there should be between the center of the projector and the center of the sound gate aperture is:**

(a) 10½; (b) 12½; (c) 14½; (d) 24½.

**10. If you take 15 amperes from a 220-volt DC circuit, the number of kilowatts you will be using is:**

(a) 0.33; (b) 3.3; (c) 33; (d) 330.

**11. In good operating practice, the volume of sound should always be controlled through:**

(a) monitor horns; (b) a connecting telephone line from the manager's office; (c) listening to the projector in action; (d) signals from an observer located in the audience.

**12. The fader should be turned to the proper operating number or level when the projector is:**

(a) started; (b) running at half speed; (c) up to full running speed; (d) shut down.

# Planning Modern Projection Rooms†

By HERBERT TUEMMEL

**From an acknowledged expert overseas comes this interesting discussion on just what and how a projection room should be.**

THE QUALITY of cinema performances is determined on the architect's drawing board. It is at this stage that the eventual efficiency of the projection room is decided, and only too frequently the architect falls short of the desired ideal through lack of knowledge of the specialized problems involved. In this article I have attempted to outline the principal requirements which the well-designed projection room should satisfy. Although these remarks are based upon the relevant safety laws applying in Germany, I feel sure that they will be found to be of general application in most parts of the world.

Before going into details concerning the equipment of projection rooms, the first consideration should be their actual location. A great deal can be achieved if from the very beginning the planning of the projection room is undertaken with due regard to its proper importance. After all, the projection of films is the only true function of a cinema, so surely the greatest amount of care should be devoted to the actual conditions of projection.

The best projection will be obtained when the optical axis of the projector beam is at right angles to the centre of the screen. The projection room should, therefore, not be unduly off-centre in either the vertical or horizontal plane (Fig. 1). Oblique projection, from whatever angle, will result in distortion of the screen image, the rectangle becoming an irregular trapezium ("Keystone effect").

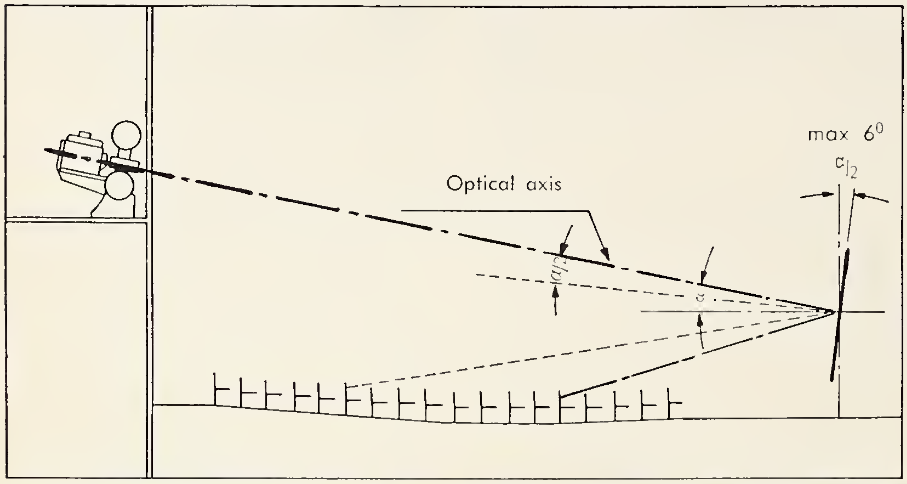



FIG. 1. Deflection effects of projection angle. The toleration angle is about 20 degrees, but even that is not always obtainble.

In order to prevent the spectator from noticing these distortions, the side curtains are normally drawn close together, resulting in a decrease in screen image size. For showing panoramic and 3-D films, it has become more than necessary to employ horizontal projection exclusively. Moreover, with curved screens additional distortions will appear with oblique projection.

However, while lateral off-set is comparatively easy to avoid, inclination of the projector beam in the vertical plane is fairly common, since unfortunately the projection room cannot always be located so that the optical axis is absolutely horizontal. The ideal solution is to place the projection room under the balcony, from which position ideal projection will be obtained. If this is not possible, the maximum deviation from the horizontal should be no more than 10°. Another way of overcoming this problem (although at the cost of the angle of view of the spectator) is to tilt the screen backwards at an angle equal to ¼ to ½ of the projection angle (Fig. 1)

### *Floor Area Requirements*

Metallized screens, however, cannot be inclined except under special conditions, since this interferes with the distribution of light in the auditorium. To conform with the current German regulations, the minimum floor area for a single-projector cabin should be 6 sq. m (square meters), with a minimum length of 2 m. The height of the ceiling at the spot where the projectionist stands should not be less than 2 m. For each additional projector the floor area should be increased by at least 3 sq. m, so that a

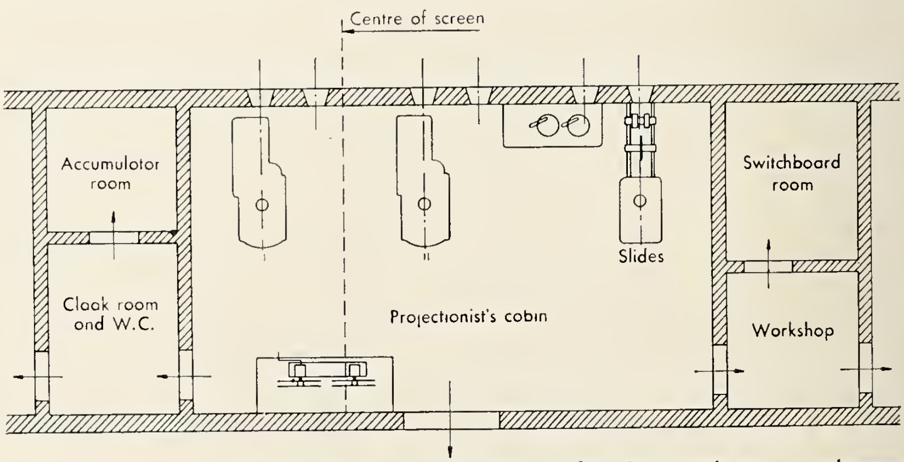



FIG. 2. A plan for a projection that might, with minor alterations, apply to a good many small houses.

† *Bild und Ton*, Zeiss Ikon, April 1957

projector room containing 2 projectors should be at least 9 sq. m in area; it should be borne in mind that these figures are only minimum requirements. If perfect projection is desired, perfect projection conditions must be obtained; niggardliness with regard to space will certainly not achieve this end. Instead of 9 sq. m., 20 sq. m would be a more desirable figure, since many new installations, such as CinemaScope equipment, have been introduced since this particular regulation was laid down.

### *Total Area Requirements*

The front wall of the cabin, containing the projection ports, should be at least 4 m long, while the projection room itself should have a minimum width of 3 m. The total volume of the projection room should be at least 37.5 cu. m. These dimensions apply to projection rooms with two film projectors and one slide projector. For each additional piece of apparatus (film projector, spotlight or slide projector), the floor area should be increased by 5 sq. m. Figure 2 shows a suitable layout for a projection room containing two film projectors and one slide projector. The re-winding table is also located in this room, and therefore sufficient floor space should be allocated to it.

An economy in width can be effected by replacing the separate slide projector by a slide attachment. The front wall of the projection room must be 25 cm thick if built of brick or 10 cm if reinforced concrete is used. Under no circumstances should there be any direct communication with the auditorium. The sunken channels through which all wiring runs should prevent smoke from seeping through.

All ports and windows should also be smoke-proofed with 5 mm thick plate glass and also provided with a 2 mm thick iron shutter. The port openings should be no larger than is needed for the uninterrupted passage of the projection beam. The windows facing the auditorium should not exceed 250 sq. cm area each. The position of the ports should be directly related to the height of the optical axis of the projector and also to the projection angle. Nowadays the ports and windows are no longer arranged at different heights, but in a straight line.

A further complication may arise when showing CinemaScope films; at present the normal projection beam occupies almost the entire area of the port, and with CinemaScope some obstruction of the beam may be experienced. On the other hand, the CinemaScope projection beam immediately in front of the anamorphic attachment is only imperceptibly wider than the normal beam and if the projector is not too far from the port glass and fitted with a lens of normal focal length the conical section of the projection port will generally allow the beam to pass.

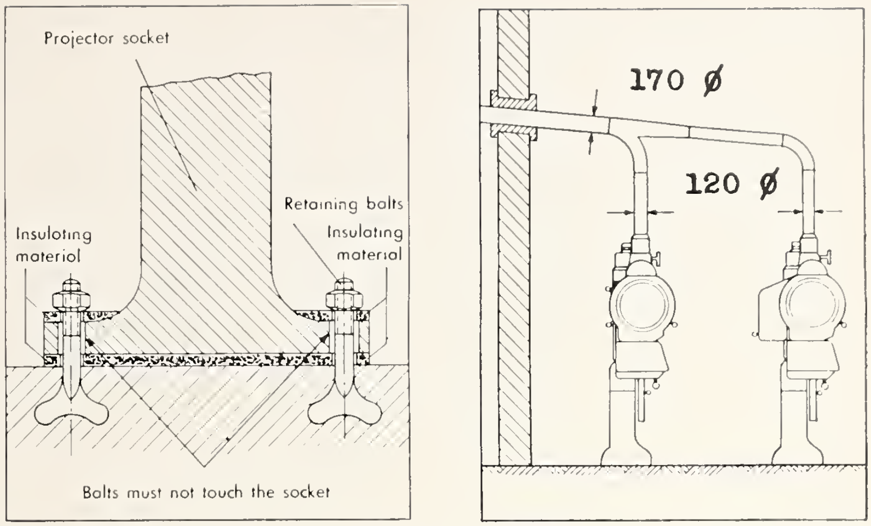



FIG. 3. Two most important items: Reducing projector machine noise (left); and projection room ventilation (right). Interesting to note in the *right*-hand diagram is the sidewise carryout, which would indicate a higher ceiling is usual.

The required width (B) of the port can be computed approximately as follows:

$$B = \frac{d \times 5}{f} + 10$$

where

B = width of projection port (in centimetres)

d = distance from front surface of lens to auditorium side of wall (in centimetres)

f = focal length of projection lens (in centimetres).

Thus;

if f = 10 cm and d = 50 cm,

$$\text{therefore } B = \frac{50 \times 5}{10} + 10 = 35 \text{ cm}$$

The room adjoining the projection room should contain all the apparatus which does not require constant attention during the performance. These include, first of all, the rectifiers for the arc lamps and also the switchboard. In addition, it will be necessary to have a battery room, which should also if possible contain a small workshop for the projectionist.

As the operation of all the various pieces of apparatus necessitates a large number of electrical cables, it is good policy to provide appropriate cable channels going right up to the projector pedestals. In this way facilities are provided for changing the circuits at any time and the location of faults is made much easier. The cable channels can also be utilized for carrying the in-and out-flowing water pipes for water-cooled projectors and may also contain air-pipes for air-cooled projectors.

### *Quiet Operating Procedure*

When installing projectors, one should ensure that their operating noise does not penetrate into the auditorium. Generally, the front wall of the projection cabin is sufficiently thick to prevent this happening, provided that the aforementioned structural conditions have been complied with. To avoid the conduction of sound, the projectors should never be placed on top of the steel girders forming the frame of the building. A very good method is to place the projectors on a concrete platform resting on sound-absorbing material. If this is not possible, they should be placed directly on to the sound-absorbing material (cork. rubber, felt, etc.), and care must also be taken to insulate the bolts anchoring the projector to the floor (Fig. 3).

The arc lamps require adequate vents to permit the escape of hot air

(*Continued on page* 32)

**Too often, in the course of other projection problems, we are apt to forget an important element: the screen.**

# A Few Aspects on Obtaining The Best Screen Image

By JOSEPH HOLT

Member, IA Local 428, Stockton, Calif.

BEGINNING some three years ago and continuing even to the present time, exhibitors began to install screens for the new film processes and aspect ratios. The replacement of screens went at a pace which was unprecedented since the advent of synchronized sound.

The point of this observation lies in the fact known to all projectionists that screens and lenses were all too frequently put in service without too much regard as to obtaining the best possible results. Rather more compelling was the need for change at the earliest possible time, and it was rare indeed for first-quality optics and screen surfaces to be installed with due regard to the consequences.

Wide-screen images were allowed to assume ridiculous proportions; sharp focus throughout the picture was unobtainable; and poor light distribution was tolerated.

But the panic is over, and there is no excuse for continuing to present degraded images to a critical public.

The first CinemaScope screens were installed with rather deep curves in simulation of the Cinerama screen, but later experience and practice proved that the radius of curvature should approximate the projector-to-screen distance. There are still numerous installations which distort the horizontal lines of the picture due to excessive screen curvature.

### *Problematic Fall-Off*

On the other hand, some theatres wished to conserve stage space or to simplify the construction of screen frames. In such cases, gain screens were improperly set without any curvature at all.

The first result of using a gain screen without curvature is the serious falling off of screen illumination at the sides of the picture. In actual field tests, it has been shown that incident light measured at a ratio of .8 side-to-center will be reflected from a gain screen mounted flat at something like a .45 ratio.

Projectionists with sound grasp of the problems involved have long endeavored to reduce the effects of "the hot spot," but this single blunder has undone all the good work of the past.

Proper screen mounting does not merely enhance the side-to-center light distribution ratio. From a purely theoretical view, it would be perfection itself to obtain a projection surface all points of which would be equidistant from the projector lens. With the throw distance equal on horizontal lines, it should follow that uniform focus all the way across the picture should be more readily obtainable.

In most instances, focus improvement will be noted with any screen mounted with radius equal to projection throw, and remaining out-of-focus troubles can be corrected by careful attention to film tracks, shoes, tension and heat. This last factor has received a great boost recently with the introduction of mirrors which pass the infra-red radiation of the arc to the rear of the lamp rather than to the aperture.

It is money well spent for exhibitors to rebuild screen frames in conformity with the principles which have been established since the advent of Cinemascope. Perhaps it is not true to state that the principles have been established; it would be more correct to say that substantial field experience has proved their validity.

Once attention to the replacement of improper screen frames has been given, it is time to consider if the screen in use is the best for the auditorium in which it is to be used. This will depend principally upon the width of the seating area, with matte screens being used in houses with extremely large viewing angles from the perpendicular.

### *The Importance of Lenses*

The matter of lenses is another step in correcting screen ills. The writer hears too many groans from projectionists to believe that modern good quality lenses have been purchased in even a majority of theatres. As previously observed, there may have been some slight excuse for using slow speed uncorrected lenses when the sudden shift to new screen sizes took place. Such is not the case today, for on shelf stock or short delay most supply houses can furnish lenses of the best quality and proper focal

### AUTHOR'S CORRECTION

In the preparation of last month's article, "Factors in Choice of Proper Lamp and Carbon Trim," in the comparison tables and text for various trims and lamp speeds, I made use of figures which did not include the new 9-mm, 10- and 11-mm carbons manufactured by National Carbon Company.

Although the captions on the graphs indicated that the current used is scaled to lower current values than are possible with the new trims, it is possible that some error may creep into interpretation of these figures.

In the course of the text, I referred to the relatively higher efficiency of the 8-mm positive at 70 amperes, as opposed to the 9-mm at 75 amperes. While this statement is quite true, the introduction of the new 9-mm for 80 amperes makes the statement less important.

Personal observation of the new carbon indicates that the claims made for it are factual. Taking the case of the 9-mm trim alone, by increasing the watts input from 3375 to 3680, or 9.1 per cent, we may obtain a light increase of something in the order of 12 per cent. The lumens per watt figure is thus substantially enhanced.

Additional efficiency is realized by reason of the lowered rate of consumption of the new carbon.

JOSEPH HOLT

length for most applications.

The insidious thing about so much of the lens trouble today is the fact that everyone concerned is apt to become reconciled to poor screen results. Every projectionist has heard the remark that "We've given up trying to get a sharp focus," and when the men directly involved with the screen presentation resign to unacceptable standards, then all suffer, especially the box-office.

Independent exhibitors all too frequently today are inclined to "make do with what we have," and circuit purchasing departments are often imbued with a spirit of "out of sight, out of mind," or even "if we ignore it, perhaps it will go away."

Projectionists faced with the task of obtaining the best on the screen must accept the responsibility of calling these deficiencies to the proper persons' attention. In some cases it may be necessary to arrange a visual demonstration of the improvemnet which can be obtained by the utilization of the best modern fully-corrected lens. Most theatre supply houses will gladly co-operate with such demonstrations.

While we are at the job of rendering our screen presentation as effective as may be possible, let us not overlook projection port glass. Articles in previous issues of IP have explored the matter thoroughly, and improvement here is usually quite spectacular.

The remaining step is now within reach. It would appear that like it or not, the Magoptical print will be with us. If so, this means that base-shifting will not be required. What better opportunity than to lock the bases properly and make certain that all apertures used fit the screen precisely when the optical center-line is established. This means that the aperture edge does not produce a shadow diffusion next to the screen masking; it also means there is not substantial "over-scan" which spills large quantities of light on the mask.

It is a continuing fight to keep up with the best. Informed projectionists need to be reminded to use their information to the best advantage and their skill to the preservation of the industry.

## Basic Differences Between Movie and TV Color

FROM a purely theoretical point of view, an *additive* color-reproduction system, such as that employed in television, is superior to the *subtractive* systems utilized for the production of motion-picture film prints in full color.

Additive methods make use of blueviolet, green, and red *primary-color* illuminants, and are thus free from the spectral imperfections of the lemon, magenta, and cyan *reciprocal-color* dyes required for color printing. The reciprocal colors are the *complementaries* of the primaries.

In actual practice, however, color TV suffers from many defects which are completely absent from color-film projection. In the first place, there is the problem of providing primary-color lights of pure *saturated* hue. These should consist of very narrow spectral bands "peaking" at the wavelengths which careful experiment has assigned to blueviolet, green, and red lights of maximum visual purity.

### Ghosts and Noise

Not only has the matter of determining the rather critical primary wavelengths been neglected, but the difficulty of finding picture-tube phosphors which emit these "dominant" wavelengths, and which have identical decay or glow-persistence times, still remains to bedevil technologists. The blueviolet and green phosphors used in present-day color tubes are close enough to true primary standards for practical purposes, but the red is too orange (green contamination) for good reproduction of the carmines, magentas, and purples.

In addition to more or less faulty primary-color generation, color-TV picture tubes are handicapped by insufficient uniformity of the tricolor phosphorescent surface, giving rise to tinted, streaky whites which are especially noticeable during black-and-white transmissions. Inherent electrical and registration defects combine to degrade the color in various ways, often producing colored "ghosts" and "noise," and sometimes completely altering the color values. Commercial color TV is far from satisfactory in its present state of development.

Color motion pictures, on the other hand, have advanced to so high a state of refinement that truly *natural* color on the theatre screen is now accepted as a commonplace. Not only do the spectral characteristics of the color negative closely duplicate the blueviolet, green, and red response of the human eye, but improvements in the reciprocal-color image-forming dyes of color-film stock, together with "integral masking" techniques and ease of color balancing, make the finished prints consistently faithful reproductions of the original colored scenes.

Not only are color movies now as bright and clear as black-and-white pictures, but the control which the producer may exercise over the final color result is truly amazing. The color may be deliberately toned or tinted to establish a desired dramatic mood: it may be weakened to the point of pastel delicacy, intensified into eye-dazzling brilliance, or left *au naturelle*.

Additive color reproduction as used in TV suffers in one or more of the mixture-color regions—the region of the purples, amaranths, and magentas, that of the blues, cyans, and aquamarines, and that of the celadons,* yellows, and oranges—when one or more of the primary-color components are either resaturated or not of the precisely correct hue.

### Intermediate Color Rendition

Color movies, being subtractive, give excellent rendition of these intermediate color groups as well as of white (clear film) and the hueless grays. Brilliant blues and yellows, and clear, unblemished whites, must lie within the capabilities of any color process.

Moreover, a rather wide latitude in the hue of each reciprocal-color print dye is permissible; and any hue shifts may be corrected in processing. Only when the print dyes depart very widely from true lemon, magenta, and cyan do color defects become evident, and these take the form of darkened purples, blueviolets, greens, celadons, oranges, and reds in the finished pictures. Even so, integral masking may still effect correct reproduction of dominant hue.

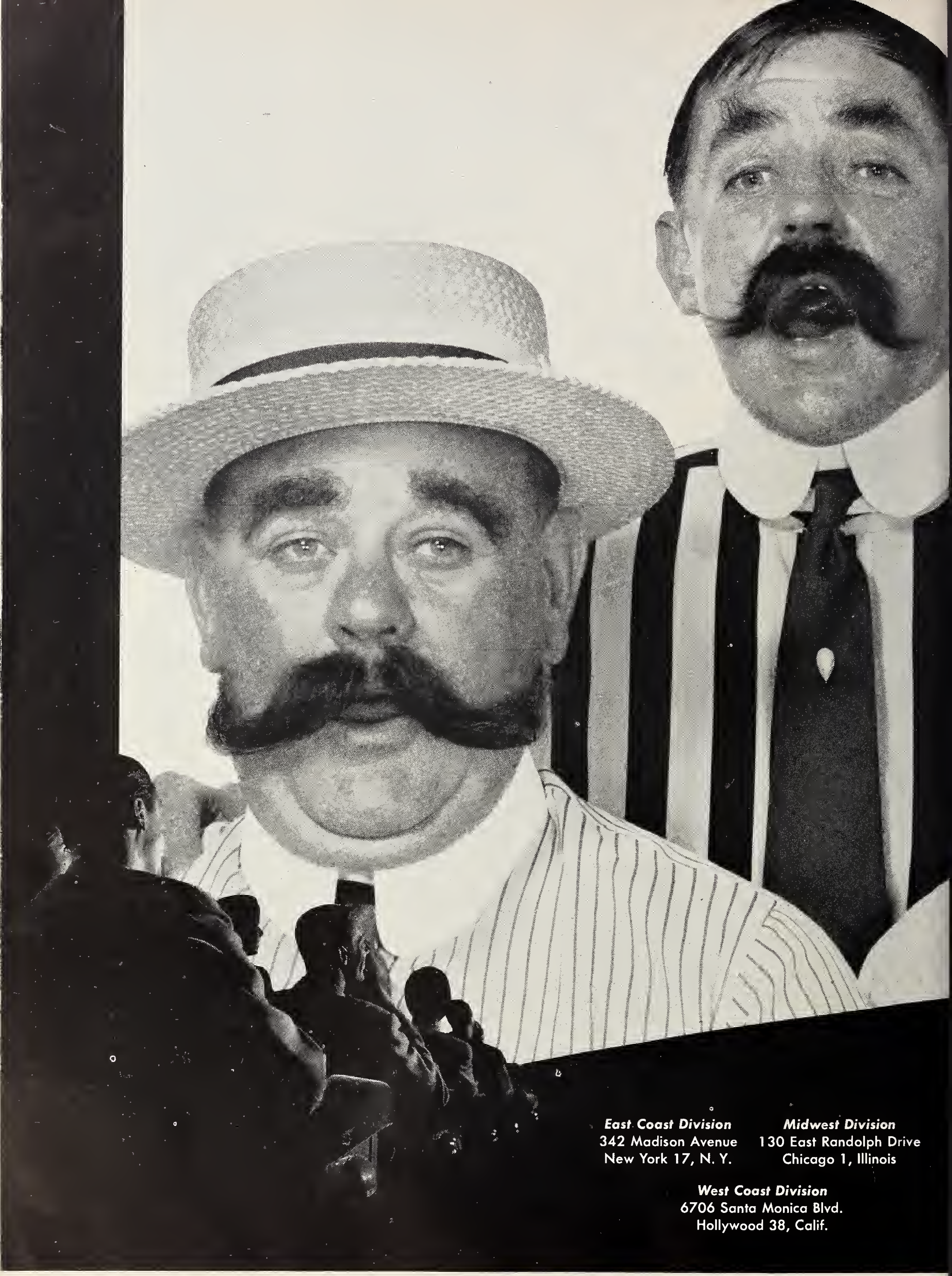
To see color reproduction at its most natural best, therefore, we shall have to go to the movies. This, many persons will agree, is a good idea, inasmuch as color-TV sets are usually out of order most of the time.

* *Celadon* is the name given to standard yellowish green. Celadon is perceptibly greener than *chartreuse*, which is standard greenish yellow.

A PERTINENT QUESTION

*(Educational Screen & AV Guide)*

"May I ask where you learned to clean film . . . ?"


East Coast Division
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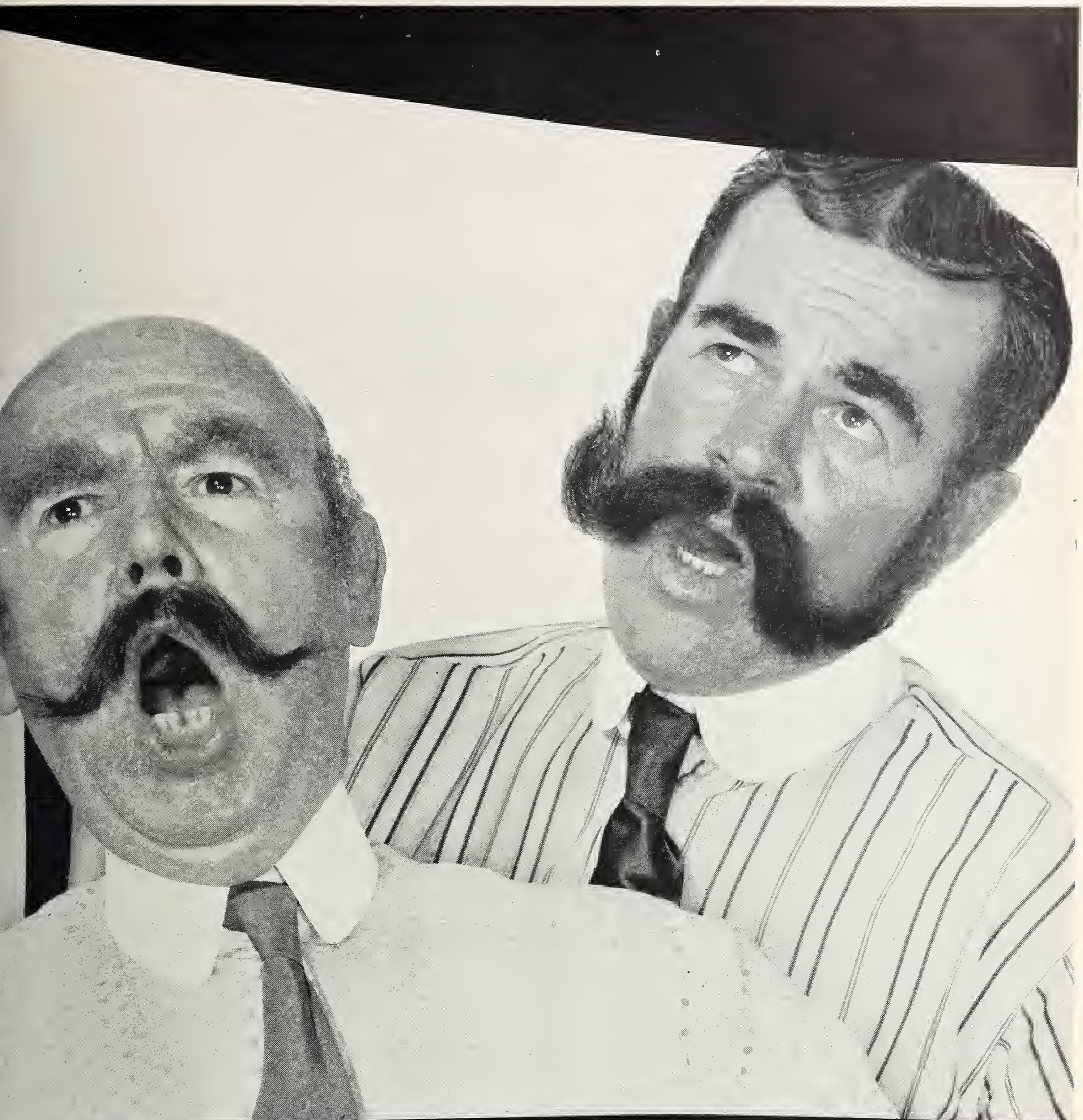
Midwest Division
130 East Randolph Drive
Chicago 1, Illinois
West Coast Division
6706 Santa Monica Blvd.
Hollywood 38, Calif.



# Close harmony...

To achieve desired effects on the wide, wide screen requires many talents—working in close harmony! Often, entirely new ideas must be explored. In fact, many of today's most effective technics were developed just this way—through close co-operation with groups such as the Eastman Technical Service for Motion Picture Film. Offices located at strategic centers. Inquiries invited.

Motion Picture Film Department
**EASTMAN KODAK COMPANY**
**Rochester 4, N. Y.**

**The function of this department is to provide a forum for the exchange of news and views relative to individual and group activities by members of the organized projectionist craft and its affiliates. Contributions relative to technical and social phases of craft activity are invited.**

# In The SPOTLIGHT

A UNION'S RIGHT to choose its own members and its contention that members are not justified in resorting to the courts without *first prosecuting their complaints within the framework of the union* was upheld in a recent ruling by the Tennessee Supreme Court. The Supreme Court's decision sustained the State Court of Appeals in its reversal of a ruling in the suit instituted last year by 19 projectionists against Chattanooga Local 259. The complainants, all members of out-of-town IA Locals, charged that they were refused membership in the Chattanooga Local.

In the original ruling the presiding judge, Chancellor Curry, ordered Local 259 to open its membership rolls to the complainants with the charge that it had violated the Tennessee Open Shop Law. Although the Local had not had a written contract with theatre owners in its jurisdiction since the passage of the open shop law, Chancellor Curry claimed that "a closed-shop oral agreement existed."

The Court of Appeals held, and the Supreme Court upheld, that there was no evidence to support the conclusions by the chancellor on the "closed-shop oral agreement," and declared that the Local had the right to give preference to applicants who were sons of members.

Furthermore, The Court of Appeals ruled that the suit should have been dismissed because the complainants did not exhaust the remedies provided under the constitution and by-laws of the IATSE *before* bringing action against the Local. Union members are obliged to uphold their pledge to abide by the rules and regulations of the Parent and Local Union, ruled the court.

• The New York State Association of Motion Picture Projectionists held its annual fall meeting October 21 at Martin's Restaurant, Liverpool, N. Y., as the guests of Syracuse Local 376. Wm. Ingram, chairman of the educational committee, presided at the afternoon session in the absence of George Raaflaub, Association president, who was home ill. The afternoon session was given over to a technical forum highlighted by illustrated talks on the following subjects: "Better Light from Carbons," by William Spooner, Lorraine Carbons; "Theatre Equipment Service Problems," by Edward Stanko, RCA Engineering Section; and "A Report on Survey of Screen Brightness," by Fred J. Kolb, Jr., of Eastman Kodak Co.

The evening session was in charge of Harry Lackey of Utica Local 337, and was devoted to the reading of reports and other Association business. A midnight banquet, with an attendance of 130, followed the close of the meeting. Two former presidents were honored with gold cards—Earl Tuttle of Binghamton Local 396, whose card was mailed to him as he was unable to be present; and Fred Boekhout of Rochester Local 253.

Among the invited guests were James J. Brennan, IA first vice-president; Fred J. Kolb, Jr.. Paul H. Preo and Robert S. Battey of Eastman Kodak Co.; Wm. B. Spooner, Lorraine Carbons; J. C. Naughton, Paul D. Ries, and A. B. West of National Carbon Co.; Edward Stanko, RCA; George R. Potter, National Theatre Supply, and Roy J. Fisher, Fisher Mfg. Co.

• James A. Sipe has succeeded Paul P. Mach as president of Pittsburgh Local 171. Mach resigned to tour with a roadshow.

• Jamestown, N. Y. Local 266 has filed unfair labor practice charges with the National Labor Relations Board against the management of Shea's Theatre there. The Local charges that the management proposed a drastic cut in pay for its members and is presently employing non-union projectionists.

• We were pleasantly surprised last month to receive visits from two of our overseas subscribers: Eric Darby from Haurski Plains, New Zealand, and Albert Buckley from Batley, England. It

## N. Y. STATE ASS'N OF M. P. PROJECTIONISTS HOLDS FALL MEET

Charles Wheeler, secretary-treasurer, presents a gold life membership card to former Association president, Fred Boekhout (Rochester Local 253), in recognition of his many years of fine service to the organization.

Pictured below are guests and officers of the Association. Front row, left to right: Paul Preo and Fred Kolb, Jr., Eastman Kodak Co.; James J. Brennan, IA first vice-president; Edward Stanko, RCA Engineering; Robert Battey, Eastman Kodak; and William B. Spooner, Lorraine Carbons. Rear, left to right: H. Paul Shay, 10th District secretary; Charles Wheeler; Harry Lackey, Association vice-president; Wm. Ingram, chairman of Educational Program; and Roy Fisher, Fisher Mfg. Co.

was our first meeting with both gentlemen, although we have corresponded with them for a number of years.

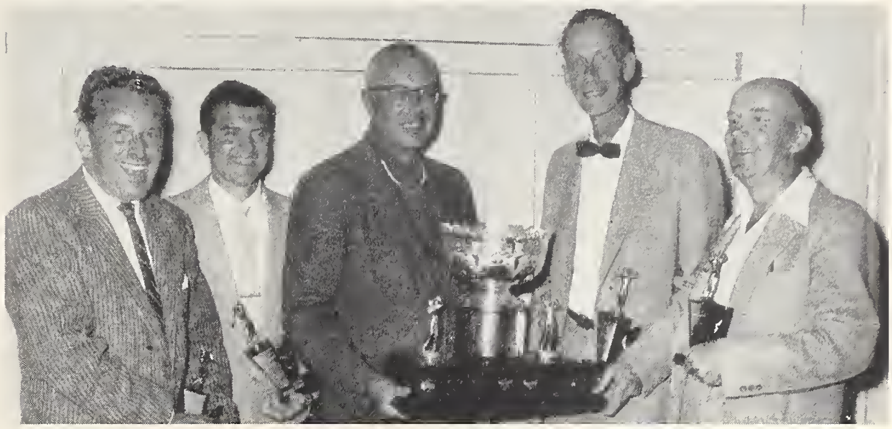
We made arrangements for Darby to visit the projection rooms of several of the top motion picture theatres in New York City, and he was deeply impressed not only with the performance of the American equipment but also with its expert handling by the projectionists. He was very appreciative of the courtesies shown him by the projection room personnel and for their patience in answering the many questions he asked them.

Albert and Mrs. Buckley realized the fulfillment of a long cherished dream with their visit to the States. While in New York City, the Buckleys were the guests of the 25-30 Clubs, and Morris Klapholz, secretary of the Club, acted as their official guide. The following letter we received from Buckley upon his return to England speaks for itself:

With reference to my recent visit to your wonderful and fabulous city, I wish to tender my grateful thanks to all who helped to make this visit a memorable one. During my stay in New York I found my friend, Morris Klapholz, a very fine host—with a very thorough knowledge of the whole area and the people therein. Nothing was too much trouble—I saw everything that I could in the time available, and thus satisfied a life's ambition.

I was glad of the opportunity to meet Clarence Ashcraft and to visit his factory. I enjoyed meeting John Alden and Harry Du Furia at the Simplex plant in Bloomfield, the projection staffs at the Rivoli and Radio City Music Hall and Ed Lachman of Lorraine Carbons. The hospitality extended to Mrs. Buckley and myself by the members of the 25-30 Club was indeed of high order and we shall always treasure happy memories of our visit.

## ANOTHER PRIZE-WINNING TEAM FOR TORONTO LOCAL 173



Local 173 trophy-winning foursome in the sixth annual Canadian Picture Pioneers golf tournament, held recently at St. Andrew's Golf and Country Club, Toronto. For the fourth consecutive year the Toronto Local-sponsored team carried off the N. A. Taylor trophy, top prize in the tournament. Shown above, left to right: Fred Cross, Jr.; Jim Georgas; Raoul Auerbach, who made the presentation in behalf of N. A. Taylor; Fred Cox, team captain; and Andy Pura. Each member of the team was awarded a miniature trophy and an imported chafing dish.

## HOSPITAL FUND INCREASED

The Will Rogers Memorial Hospital Fund was increased more than $1000 this year as a result of the save copper drippings campaign by the members of Los Angeles Local 150. Shown above is Nels Matheson (left), coordinator of the drive, presenting a check for the Fund to George Schaffer, Local business representative.

• The many friends of Morris J. Rotker, popular past president of the 25-30 Club, were grieved to learn of the sudden death last month of Mrs. Rotker. The Rotkers recently celebrated their 40th wedding anniversary.

• Wilbur F. Wepner, secretary of Local 323, Springfield, Ill., was re-elected president of the Illinois State Conference.

• Local 259, Chattanooga, Tenn., observed its 47th anniversary last month at a midnight banquet held at the Hotel Patten. IA Assistant President Walter Diehl was the special guest of honor. Representatives from nearby IA Locals joined in the celebration.

• Projectionists and other workers at motion picture theatres in Scotland are protesting through their trade union a proposed cut by exhibitors of the present double-pay for Sunday work. Union leaders contend that this proposed cut would work a hardship upon their members and they plan to fight the move.

• Conrad Krieger (Local 586, Grand Island) was re-elected president of the Nebraska State Association at its annual convention, which was held last month at Fremont, Nebr. Other reelected officials are H. C. McMullan (Local 151, Lincoln), vice-president; and Clyde Cooley (Local 343, Omaha), secretary-treasurer.

• *News from Local 299, Winnipeg, Man., Canada:* Lloyd Biggerstaff was appointed projectionist at the Board of Censors (Manitoba), a position left vacant with the death of former projectionist, Gary Rushworth, who was killed in an automobile accident. . . . Ed Haugen, former sound service man for J. M. Rice Co., is now working as projectionist and sound technician for the Fox chain of theatres in Excelsior Springs, Mo. . . . Joe Minneault is now at home recuperating from a serious operation. . . . Jim Biggerstaff represented the Local at the recent Manitoba Federation Convention. . . . Ray Reaney, the Local's star golfer, won the major prize at last summer's 4th annual golf tournament, sponsored by the Canadian Motion Picture Pioneers. . . . Cecil Parker has returned to his job as projectionist at the Rialto Theatre after a three-month layoff due to ill health.

## OBITUARIES

THORNBERRY, WILLIAM N., 47, member of Local 303, Hamilton, Ont., Canada, died several months ago. A former president of the Local, he was an ardent unionist. He was the Local's representative at the Worker's Education Society.

• • •

McCALL, EDWARD, 68, member of Philadelphia Local 307 for 38 years, succumbed to a heart attack suffered while working in the projection room of the Goldman Theatre in Philadelphia. He is survived by his widow and nine children.

• • •

REED, JACK L., 55, charter member of Local 612, Abilene, Texas, was stricked with a heart attack last month while visiting his brother in Brownwood. He has served the Local as secretary-treasurer and as business representative for many years, and for the past 8 years had been a gold card lifetime member. He was a 32nd degree Mason, a Shriner, and a member of the Woodmen of the World. His widow, two sisters, and a brother survive him.

# 16-mm PROJECTIONS

THIS DEPARTMENT is mainly devoted to what is known as the audio-visual field. IP considers this section of the motion-picture industry of extreme importance, as do leaders in education, industry, medicine, the armed forces, etc., who have spent billions (we mean billions) of dollars on this medium. The influence it has had and will have is immeasurable, and the technical advances in what used to be considered an amateur hobby have been outstanding. To be sure, 16- and 8-mm is still an amateur hobby, but it has also penetrated the professional entertainment field in both TV and motion-picture theatres—including drive-ins. But its main function remains in the world of instruction.

Progress, of late, seems to be increasing speed. And, as the world changes, so must its chronicles—including this magazine. Considering the amount of inquiry IP has received concerning 16- and 8-mm, we feel that the medium deserves notice here. This magazine is by nature technical, but, as in other departments of IP, this will not prevent the inclusion of noteworthy news of a general nature.

## B & H's Electric-Eye 16-mm Camera

A UNIQUE 16-mm movie camera has been developed by Bell & Howell in their new spool-loading electric eye camera, which joins the magazine-load model introduced by the company last year. In both cameras an electric eye or photoelectric cell automatically turns the lens to the proper exposure setting for the light available.

Designated the model 240EE, the amateur camera embodies the features of Bell & Howell's regular 240 line. Those would include a long 32-foot spring run, and completely automatic threading. Threading procedure merely consists of slipping the film end into the threading mechanism, pressing the starting button, and speeding the film along its path. Opening or closing the film gate, sprockets, or loop formers occurs automatically.

The camera has 100-foot film capacity, single-frame, continuous-run lock, and camera speeds from 8 to 48 frames per second. The spring run gives approximately 80 seconds of continuous filming at 16-frame speed.

Operating in the same principle as the human eye, the photoelectric cell opens and closes the lens iris automatically to adjust to varying light conditions. The purpose behind this is to enable the camera operator to shoot a scene without having to attend to *f* stops. However, the lens barrel is graduated in *f* stops for those who wish to disconnect the electric eye for special effects.

### *Electric-eye Advantages*

Bell & Howell makes claim that the electric eye is useful when a scene includes both brightly-lit and deeply-shaded areas. Their example: "As the camera is turned from one such area to another—perhaps in following a moving subject—the lens iris automatically opens or closes to adjust to the changing light as needed. Typical conditions of this kind might occur at a picnic site where a sunny field is surrounded by woods; in a back yard partly shaded by an adjacent building; or on a bright day at the beach, where a swimmer may go back and forth between water and sand, and the shelter of a beach umbrella."

A provision for those frequent times when light is inadequate for good taking is a tiny built-in electric lamp that illuminates a red warning mask in the 240-EE's viewfinder.

A Bell & Howell 20-mm *f*:1.9 lens in a focusing mount is fitted permanently. Auxiliary wide-angle and telephoto attachments screw directly into the lens barrel. The company states that the wide-angle attachment permits the inclusions of a greater area in the picture from a given camera position, and is useful for filming at close quarters. The telephoto attachment is, of course, used to bring distant objects closer. The camera lens continues to set itself automatically with either attachment in place.

### *Positive Viewfinder*

The viewfinder is of the positive type, and takes interchangeable objectives to match the fields obtained with the camera lens alone, or in combination with the wide-angle or telephoto attachments.

An easy-winding crank which folds back out of the way winds the motor. To afford constant speed throughout the 32-foot run, a "negator-type" spring is installed. A positive stop halts the mechanism with the shutter closed, avoiding flash frames.

The camera housing is die-cast aluminum, side panels are black grain leather, and the rest of the housing is durable Tyrolean gray wrinkle finish with satin chrome trim.

On the side of the camera is a control panel containing the camera speed dial, an indicator showing how fully the motor is wound, and a dial indicating how many feet of film remain to be exposed.

An accessory cowhide leather combination case is available. List price for the camera at this time is $329.95.

## Free Slide Rule

A SELF-COMPUTING slide rule that determines screen size, projection distance, and focal length of lens required for any type of overhead or opaque projector is being made available to dealers and users free of charge.

This slide rule makes it easy for those using visual aid projectors to compute the individual specifications required to meet specific projection problems. Write: Projection Optics Co., 330 Lyell Ave., Rochester 6, N. Y.

## Kodak's Three Booklets

EASTMAN KODAK CO. has recently published three booklets of pertinent interest to the audio-visual field. Perhaps most important of all is the "Movie Photoguide" ($1.50) which includes, as compactly and completely as possible, what both the professional and amateur 16- and 8-mm movie-maker should know. The handy pocket volume includes all facets of making a motion picture from exposures and lenses to story material. One particular feature of the booklet is a number of dial computers on organization, depth of field, effective aperture,

etc. For its price, it is this magazine's opinion that it is the finest manual available.

There is also a pamphlet "Foundation for Effective Audio-Visual Projection" available at no cost. This deals with the effective showing of movies, slides, and slide films, and although especially designed for the person who utilizes audio-visual equipment professionally, the book has many helpful suggestions for anyone who puts on slide or film presentations.

Included in the book are sections on how room facilities, seating plan, screen size and type, loudspeaker location, projector location, image brightness, and projector distance contribute to the effective use of A-V equipment. There is a table on the lumen output of Kodak projectors.

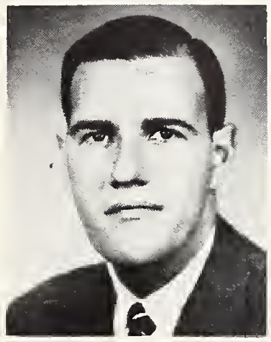
For 50 cents the A-V professional or enthusiast may obtain the Kodak booklet "Industrial Motion Pictures," an optional addition to the recently revised Kodak Industrial Handbook. The company asserts that: "Although primarily designed to assist the industrial motion picture photographer the publication also provides the serious amateur motion-picture photographer with many answers to problems concerning procedures and materials in film production." The booklet, like most Kodak publications of this medium is able to be bound.

## A Pertinent Note

For those in the A-V field that haven't already done so, it might be noted that the National Audio-Visual Association's new directory—which contains information on the specific services offered by some 400 audio-visual dealers throughout the United States and Canada—is now available. NAVA dealers are listed by geographical location and particular service and facilities. Single copies of the Membership List and Trade Directory are available free to audio-visual users from: National Audio-Visual Association, Box 337, Fairfax, Virginia.

## PERSONAL NOTES

George C. Noble has been appointed a district sales manager for Radiant Screens of Chicago. He will represent the projection screen manufacturer in seven western states. Before joining Radiant, Noble was a retailer, film salesman, distributor's representative, and photo finisher. Based in Seattle, Washington, he is now traveling extensively within his territory.



George C. Noble

* * *

E. I. du Pont de Nemours, Inc. has announced three new appointments in sales activities. Wilton R. Holm, technical associate at du Pont's Parlin, New Jersey, Photo Products Research Laboratories, has been named sales service representative for motion picture products.

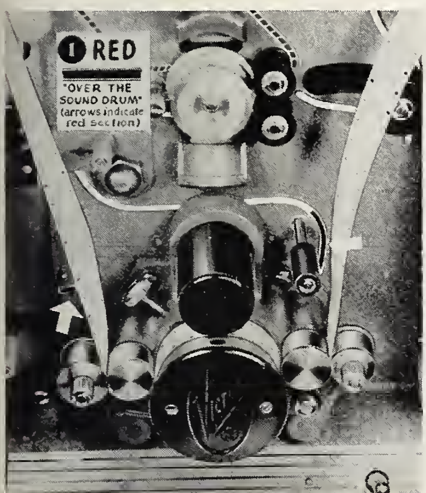
* * *

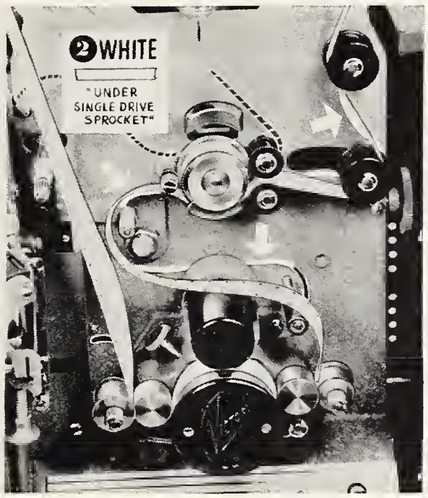
W. C. Michel, executive vice-president of 20th Century-Fox, has been cited by the United Epilepsy Association for his work in behalf of the organization. Michel is chairman of the fund-raising drive for the motion picture industry. Dr. Houston Merritt, chairman of the medical advisory board of the Association, and Carl Marks, its president, made the presentation.

* * *

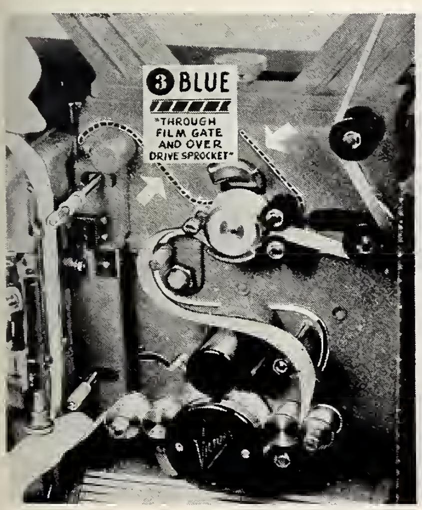
Three appointments in the apparatus and optical division of Eastman Kodak Co. have been announced. Douglass C. Harvey has been appointed assistant manager of the development and engineering departments of the division, which is located in Rochester, N. Y. Donald L. Wood has been named assistant to the manager of these departments, and will also continue in his present position of engineering on still picture products. Emil C. Steinle has been appointed assistant superintendent of optics manufacturing for the division.

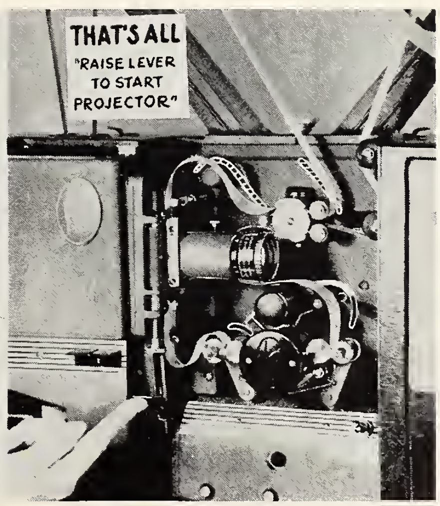
## VICTOR 16-mm PROJECTOR COLOR-CODED THREADING PROCEDURE




**Victor Animatograph Corp. has developed a new color-coded threading procedure for its line of 16-mm sound projectors. Red, white, and blue guide lines—indicating the three basic steps in threading—are painted directly on the housing. Stepwise: (1) red for sound, the film being threaded along the thread path over the sound drum; (2) white, the film is threaded along the white path under the single-drive sprocket; and (3) the blue path is followed through the film gate and over the single-drive sprocket.**



# IP TELECASTS

## An Open Letter from Bartlesville

*To the Editor of IP:*

I've just read your comment in the September issue of IP, Monthly Chat column, on pay-TV. You said: ". . . it has not been stated just where the projectionist fits into all this."

I would like to take this opportunity to express my opinion on this, for I am one of the four projectionists who is working on the Bartlesville Telemovie experiment. I say that the projectionist fits into the picture of pay-TV perfectly. An experienced projectionist is necessary for smooth operation of Telemovies.

Here in Bartlesville the studio is run by four projectionists and one TV engineer. Four projectionists were selected from the Video Theatres circuit to work on the Telemovie project: Lee Findley and Jay Spears, two Bartlesville projectionists, Don Turley of Ada, Oklahoma, and myself from Stillwater, Oklahoma.

It takes two men to run Telemovies. Two men work one shift from 12 noon to 6 p.m., and the other two men work 6 p.m. to midnight. One man works on the console while the other works as projectionist. The projectionist keeps the four projectors loaded, film rewound, etc., while the man on the console controls the video and audio signals, and makes necessary changeovers by remote control.

Stan Socia, the TV engineer, is necessary in the operation to keep the TV equipment functioning properly. All of us have worked with Telemovies from the start. We helped install and wire the studio equipment, and have learned a lot by doing so. Working with Telemovies we are, of course broadening our skills by learning to work with TV. The projectionist is the ideal man to work on Telemovies. His skills and experience are half the battle of making Telemovies a success.

Since Telemovies has gone into operation here, we have come across problems which needed solving, and we have worked out the problems. Now that Telemovies are a reality, it is up to the public as to whether it will be a success or not.

I have read the recent articles in IP about Telemovies and have found them quite interesting; I realize that much of this information was released before Telemovies was completed. There have been many changes made in Telemovies even up to the very last minute of installation.

If there is anything I can do to help in bringing Telemovie information to fellow projectionists, please let me know. Phil Hays, Video Theatres manager, and Milton J. Sharp of Jerrold Electronics have invited everyone in the industry to visit the Bartlesville experiment. I hope that all of you at IP will have the opportunity of seeing this new experiment.

LAWRENCE E. JOHNSON

Bartlesville, Oklahoma

### Editor's Comment:

We'd like to accept the invitation. An affable Oklahoman named Griffing, who just happens to be the president of Video Independent Theatres and Telemovies, was in town a while back, and we went over and had coffee with him to ask a few questions. We, of course, asked about the projectionist set-up, and that has been clarified by the above letter. In the main, Griffing was optimistic about proceedings in Bartlesville. "I am personally amazed," he said, "that more than 500 families would invite Telemovies into their homes almost sight unseen. When we planned this test, we projected we would have 200 by this date." The wired area of Bartlesville includes 5200 homes, of which 4500 have TV sets. This would mean that Telemovies is getting one out of nine potential customers.

A few weeks later, Griffing keynoted the experiment as a test to prove Telemovies desirable, feasible, and saleable. "We are confident the public will find them desirable," he said. "We believe they are financially feasible, and it's our job to prove they are saleable. Video is more interested in making cable connections than in making history. Video does not consider Telemovies as pay-TV, but as an extension of local motion-picture exhibition." He noted, rightly so, that the success of Telemovies is bound to depend to a large extent on the quality of motion pictures.

To that end, Video Independent Theatres has begun its "hard sell" campaign with a Telemovie Fall Festival program. The initial hoorah has quieted, and now the real selling must begin. Just how that will be accomplished is still nebulous, as no specific plans have been announced by the company.

But all is not roses riotously with the throng. There have been two major objections to Telemovies: (1) there is no freedom of choice of product. At present the set owner gets 13 new films on one channel, 18 reissues on another, and no matter the amount of films seen by the viewer, his bill is the same. Which brings us to (2): the price is fixed and too high.

#### Some Pertinent Resistance

Then, too, competition is looming fast on the tollvision horizon. Even though such research organization execs like Sydney Roslow of Pulse, Inc. said recently, "I think more people will go broke trying to get it off the ground than will ever make a mint out of it," companies by the score are jumping into toll-TV with both feet and closed eyes. However, tollvision is, as Roslow pointed out, "a logical service." But it is a somewhat skewed logic. Pay-TV will put the burden of cost on the consumer rather than on the advertiser as heretofore. The better the product, the more expensive it's going to be, something that has always been true in most commercial fields, with the exception of free TV. Well, let the buyer beware.

There is no doubt that closed-circuit, wired, and air-toll TV have been hogging industry headlines of late. At the recent SMPTE convention, closed-circuit TV was pretty much the topic of conversation and formal meetings. At this writing, the TOA-TESMA convention in Miami is highlighting a full day set aside for a joint session on cable TV: "Is Cable TV Good or Bad for the Exhibitor?"

The FCC has agreed to give the nation's TV stations a chance to try subscription TV in a cautious and limited statement that applications would be considered "subject to the furnishing of pertinent information and controlled conditions under which the pay-TV tests would be conducted." And out in Los Angeles, the City Council okayed franchise bids for Skiatron, International Telemeter, and Harriscope. The franchises go for 21 years.

There are, at present, five pay-TV

systems. It used to be that you paid your money and took your choice. It may be that you just pay your money. Or it may be, as Ernest G. Stellings, president of TOA, believes: "I would not be surprised if home-toll over the airwaves will be completely outlawed at the next session of Congress."

Well, as the song goes: "You might have been a headache, but you never were a bore."

Technically speaking, we are most grateful to Lawrence Johnson for his informative and, we hope, reassuring letter.

## RCA-Ampex Tape Swap

RCA AND AMPEX CORP. have entered into an agreement to exchange patents on video tape recording. It is understood that the exchange involved the Ampex patent on its monochrome recording process and the RCA patent on its color tape developments.

Ampex was the forerunner of black-and-white tape recording, entering the field a year and a half ago. Since Ampex was already in production, RCA decided to concentrate on color recording, and it is believed has advanced further along that line than Ampex, therefore the trade of patents.

Ampex has a laboratory model of a color tape recorder, but the company concedes that its output is still fairly far off. RCA, on the other hand, is aiming for an early 1958 delivery of color tape recorders to the major networks. The practicability of making color tape recorders on a commercial basis is still somewhat of a question, considering that even usual color TV process has not been an overwhelming success. Meanwhile, Ampex has stepped up developments, research, and production on their black-and-white video tape.

## New Kinescope Film

DuPONT has developed a new fine-grain, low-contrast photographic film for TV use said to be 2½ times faster than that for DuPont Type 824. The new Type 834 TV Recording film is designed for photographing either negative or positive images on TV monitor tubes.

The high speed of the film will allow either a reduction in the "drive" on the kinescope tube to reduce image flare, or use of a smaller *f*-stop to improve depth of focus, it is stated.

Type 834 TV Recording film is available in both 16-mm and 35-mm sizes.

**ROBERT A. MITCHELL'S MANUAL OF PRACTICAL PROJECTION**

What Is YOUR Problem?

# Projection CLINIC

## Elimination of Machine Noise in Sound

THE WHIR OF PROJECTOR motors and gears is sometimes faintly heard over the stage speakers when the optical sound system is turned on and the projectors run without film. The cause of this "machine noise" is usually a defective exciter or photocell, or socket for either of these components.

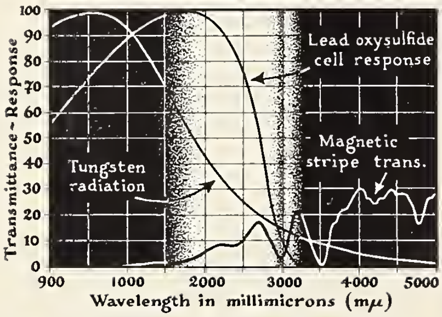
While a trace of *very faint* machine noise, when the sound-system gain is turned all the way up, is nothing to worry about in the case of systems having preamplifiers on the front of the projectors, noise loud enough to be heard by the audience during moments of intended silence requires investigation.

Only one projector produces the noise, as a rule. Turn on the offending machine with the optical-sound amplifiers operative and at maximum volume setting. Place a card in the scanning beam to prevent exciting light from reaching the photocell. If this stops the machine noise, the trouble is definitely a vibrating element in the soundhead optical train.

Test the exciter first. Examine the socket and tighten, if necessary. Replace the exciter with a new one. If the machine noise then continues when the card is removed, the offender is probably the photocell itself.

Like amplifier tubes, photoelectric cells are sometimes "microphonic," the slightest jar or vibration producing loud thumping or ringing sounds. If the cell makes a loud noise in the sound when lightly tapped with a pencil, the cathode support or the entire glass envelope may be loose. Try a new photocell. Continuation of the machine noise may then indicate a loose photocell socket, faulty contacts, or a wrongly positioned socket which allows the photocell to touch the photocell condensing lens, the photocell light shield, or some other rigid part of the soundhead.

Consistent machine noise in systems using preamplifiers mounted on the projectors indicates a microphonic vacuum tube. Such a tube will generate machine noise when the projectors are turned on regardless of whether the photocells are illuminated.




This is a graph of the infrared region of the spectrum between 900 and 5,000 millimicrons. (Human vision perceives only the region between 380 mμ in the extreme violet and 740 mμ in the extreme red.) Shown here are curves indicating the lower end of tungsten exciting-lamp radiation, the response of the lead oxysulfide photocell, and the transmittance of magnetic soundtrack striping on motion-picture film.

The light portion of the graph indicates the comparatively narrow wavelength band in which the lead oxysulfide cell responds to an optical track covered by a magnetic track. Because the conventional cesium-silver-oxygen photocell is not excited by infrared wavelengths below 1,150 mμ, lead oxysulfide cells are necessary to obtain optical response through magnetic striping.

## "Transparent" Tracks

THE NEW "TRANSPARENT" magnetic soundtracks are not transparent in the ordinary sense of the word. You can't see through them. In fact, "transparent" magnetic tracks and ordinary opaque magnetic tracks are one and the same thing!

The opaque chocolate-brown magnetic tracks with which nearly all projectionists are familiar are actually transparent to certain types of photocell. An infrared-sensitive photocell, such as the lead oxysulfide photoconductive cell used in Army JAN projectors, readily "sees" through the striping used for magnetic tracks.

Magnetic tracks "look" gray to the lead oxysulfide cell. A superposed optical track, therefore, can be "read" by this type of photocell, permitting reproduction of an optical track which is completely hidden to human vision by the magnetic striping!

The remarkable discovery that magnetic tracks weakly transmit infrared radiation between 1,500 and 5,000 millimicrons was made by accident.

Tungsten exciting-lamp radiation, however, falls off sharply below 3,500 mμ, and the lead oxysulfide cell does not respond to infrared beyond 3,000 mμ. The useful wavelength band for optical reproduction through magnetic striping accordingly lies between 1,800 and 2,800 mμ, as the accompanying graph reveals.

Optical reproduction through magnetic striping, moreover, is attended by several faults, and attenuates the sound to a degree which is about double the 6 db attenuation resulting from the use of half-width "magoptical" tracks with conventional photocells.

Optical tracks overlaid with magnetic striping do not reproduce at all with conventional red-sensitive cesium-silver-oxygen photoemissive cells, which are as blind as bats below 1,150 mμ. (Human vision ceases at about 740 mμ, according to the most recent investigations.) For the overstriped optical tracks to be used, therefore, the standard red-sensitive photocell must be replaced by a lead oxysulfide cell. It is not likely that the theatre field is willing to make this change, which requires refocusing the optical tubes of soundheads for infrared radiation.

### Cesium-Antimony Photocells

Manufacturers and processers of color film, for example, have long advocated the use of blue-sensitive cesium-antimony photocells to allow the use of soundtracks printed in colored dyes, which transmit low red and high infrared; but the theatre field would not countenance such a change. In this respect the field exercised commendable wisdom, for blue-sensitive photocells increase hum in equipments employing 60-cycle AC-powered exciters, and they exaggerate the adverse effects of line-voltage variations in all types of sound systems. The reason is that small variations in line voltage make the light emitted by exciter filaments redder or whiter—and blue-sensitive cells are extremely sensitive to color changes in the exciting light.

Projectionists, already plagued by half-width optical tracks, need not worry about an immediate inundation of so-called "transparent" magnetic tracks striped over optical tracks. Rather, there may soon be a return to standard optical tracks unmarred by magnetic tracks.

## The Inscrutable Orient

The first three VistaVision products from Daiei Studios in Japan are: "Bloom in Hell," "Escape From Temptation," and "Murder In The Lotus Bed."

## BOOK REVIEW

CLOSED CIRCUIT TV, *Morris A. Mayers and Rodney D. Chipp,* Rider Publications, 1957, 250 pp., $10.00

This is the definitive work on closed-circuit TV. Profusely illustrated (there is at least one illustration on every page), this volume has been put together with care, intelligence, and a nice clarity of style.

Closed-circuit TV is now a major factor in industry and education, and the timeliness of this book is undeniable. It is not an engineering or technician's manual—it was written to give management the facts. And that it does, to a complete degree. Just about every question pertaining to closed circuits is answered—with an impartial discussion of some of the disadvantages and limitations of that medium.

The volume is in two parts: "Applications of Closed Circuit Television," and "How Closed Circuit Television Works." The first part contains descriptions of closed-circuit operations in sales, medicine, advertising, military, and human relations, to name a few. The second part is a detailed, yet admirably clear description of just how the system operates, why it operates, and the most profitable way to operate it. Significant of the authors' coverage is the inclusion of a discussion of costs, etc.

Messrs. Mayers and Chipp, both professional experts in their field, are to be lauded for a comprehensive work. The printing and reproduction is excellent, and we have only the highest recommendation.

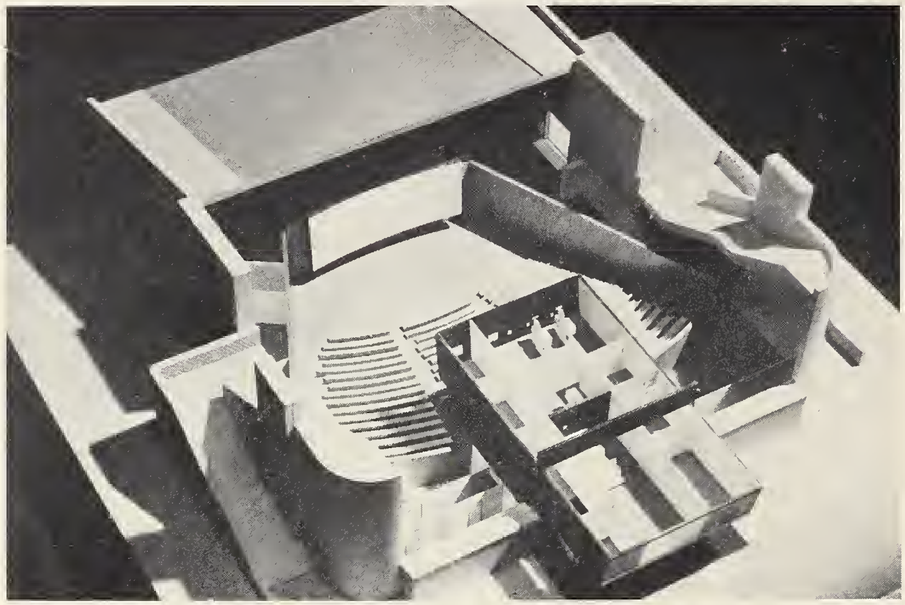
### RCA's New Service Program

A new RCA Planned Theatre Service Program has been launched by that firm. Information of it will be outlined in a special brochure that is being mailed to all exhibitors in the country. Introduction of the broadened program was made at a series of regional meetings throughout the nation. The meetings covered new service techniques, improved test films, new test equipment used in the program, and special training films detailing the program's operation.

### New Production Code Review Board

In a move to combat outmoded censorship, Eric Johnston, president of Motion Picture Association of America has announced official establishment of a new Production Code Review Board which he will head. The 20-man board consists of 6 exhibitors, 4 producers, and 10 members of MPAA.

**This new and versatile overseas construction features a central projection room equipped for two theatres.**



This model shows the main auditorium, to screen end with projection room—which contains equipment for both the main and small preview theotres. The smoller theatre overhongs the entrance at the lower end of the photogroph.

# Britain's National Theatre

LAST MONTH Princess Margaret formally opened the British National Film Theatre to an internationally representative premier audience that included such stellars as Sir Lawrence Olivier, Gina Lollobrigida, Rene Clair, and Vittoria de Sica. The theatre is situated under the vaults of London's Waterloo Bridge—a site which specifically dictated the architectural planning limitations.

Constructed to the design of the Architects' Department of the London City Council, the building is actually two theatres—a public auditorium seating 500, and a private preview viewing room that will accommodate 25 people. A central projection room contains necessary equipment for both. Projection, sound reproducing, and screen equipment for both theatres was supplied by Rank Precision Industries, Ltd.

### *Viewing Problems*

The height of the screen being dictated by the underside of the bridge and a sharply inclined floor under the screen, the possible height of the picture was 12 feet, 6 inches, the width of the widest ratio CinemaScope at 32 feet, 6 inches. The best viewing distance arrived at for a screen of these dimensions is between two and five times the height, making the front row 24 feet, and the rear row 64 feet. The extreme sides of the seating area were determined to be a maximum angle of 115 degrees. The floor of the auditorium has a 1 in 8 slope on curved steppings covered with a specially designed carpet—the largest one-piece carpet on a curved-step auditorium (1,250 yards).

Considering all known film systems and those still in the process of development, screen provisions had to be made for at least 10 ratios. For greater flexibility, the screen has been placed inside the auditorium, eliminating a proscenium.

The Harkness stereo screen is suspended on a space frame of tubular construction standing on four 3-inch diameter tubes. The widely diffusive screen incorporates an electrically operated magnascopic masking for varying the width of the picture—height being common for all ratios—thereby giving an inner ratio balance.

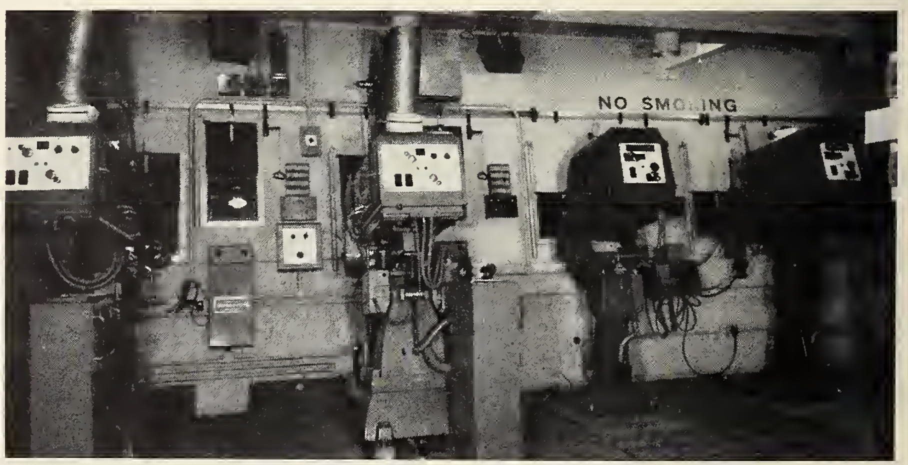
Another feature is a specially-designed panel of abstract shapes made into a two-leafed shutter as part of the screen space frame. The shutter, curtain-like, parts in the center and moves on special tracks to the rear of the screen during film presentation. 432 panels of 9-mm ply surfaced with plastic paint treated to give a broken stucco effect with a gilt finish comprise this shutter. Panels are separately hinged and suspended on steel rods.

The screen equipment (new name: Gaumont-Kalee "Monovistal") is surrounded by black masking. In front of it, for live lecture purposes, a sectional staging consisting of 15 sections on lightweight tubular beams is supported in floor sockets. Lighting and microphone wiring is housed in a sectional box along the front. The staging is easily erected or dismantled.

### *The Preview Theatre*

The small preview room is situated over the theatre entrance, and includes not only facilities for 10 ratios, but also a rear projection screen to the front of the theatre. Since the building is under the Waterloo Bridge, the plate glass facia is continually in shadow, an aid for advertising purposes.

The designing of this gave rise to an architectural problem—in order to



Bonk of equipment for the main theatre: two Gaumont-Kolee "20" 35-mm projectors with President arcs, ond two G. B.-Bell & Howell Model 609 16-mm arc projectors.

project onto the special Harkness rear projection screen, the inner, normal screen had to be removable. This was solved by designing a special tubular steel open-type frame with side electrically-operated magnascopic masking. There is a Harkness pull-up roller screen operated by winch gear, with black plastic masking at top and bottom. The framework also carries a velour curtain and dress legs.

A centrally-located projection room serves both theatres, but with entirely separate installations. The main theatre is equipped with two Gaumont-Kalee "20" 35-mm projectors that run at 16 and 20 frames per second for silent films, and 24 frames per second for sound films. They have series 'S' lenses and Varamorph variable anamorphic lens for all ratios.

The sound system is Gaumont-Kalee "21" dual 30w optical reproducer equipment. In addition, there is a four-track magnetic stereophonic system, with 10 auditorium effects speakers, and three main speakers behind the screen. Provision has been made for future installations of multi-magnetic/optical track follower heads and interlocks. Along with this, projectors are interlocked for 3-D and unmarried prints, with allowance for any future developments in processes—as far as is foreseeable.

The arclamps are Gaumont-Kalee Presidents.

The projection room also contains, next to the 35-mm projectors, two G. B.-Bell & Howell Model 609 arc 16-mm projectors equipped to run at sound or silent speeds, and either optical or magnetic track sound reproduction.

### *Preview Theatre Equipment*

For the smaller theatre, two Gaumont-Kalee "18" 35-mm projectors serve, with Dual 18w sound film reproducer with Universal arcs. One machine is equipped for rear projection.

16-mm facilities are provided by a G. B.-Bell & Howell Model 630 projector specially adapted for long running with either optical or magnetic sound systems. Recording facilities on magnetic track is installed.

To allow lenses of the most advantageous focal length, the length of throw and angle to the main screen was the major factor in determining the position of the projection room. There is no distortion of the projected

(*Continued on page* 30)

## Xmas Drive Starts for Will Rogers Hospital

Theatre equipment manufacturers, dealers, and their employes have begun to formulate plans for the annual Christmas drive to raise funds for the Will Rogers Hospital and Research Laboratories by appointing committees with representatives in various parts of the country.

Although efforts had been made yearly to effect the cooperation of manufacturers and dealers for company contributions (and fairly successfully), committee members now believe that contributions from employes themselves will serve a dual purpose: it will educate the employes that the Will Rogers Hospital belongs to them (and will treat them and their families free for almost all chest diseases), and at the same time solicit the employes for contributions.

Members of the manufacturers committee are: Bernard M. Bodde, Jr., Bodde Screen Co.; William A. Gedris, Ideal Seating Co.; J. Robert Hoff, the Ballantyne Co. (past president of TESMA and a member of the hospital's board of directors); Edward Lachman, Lorraine Carbons, Inc.; and Fred C. Matthews, Motiograph, Inc.

The theatre equipment dealers committee consists of: W. E. Carrell, Falls City Theatre Equipment Co.; C. C. Creamer, Minneapolis Theatre Supply; J. Eldon Peek, chairman of the board of directors of Theatre Equipment Dealers Association, and president of Oklahoma Theatre Supply; W. A. Turnbull, executive vice president, National Theatre Supply; and L. M. Wutke, Pembrix Theatre Supply Co.

Coordinator of the combined drive is Merlin Lewis, executive secretary of TESMA. Contributions of the manufacturers and dealers are expected to clear through Lewis' office for recording, and thence turned over to the Hospital's New York office.

Harold Hornstein of Joe Hornstein, Inc. has been named chairman of the local arrangements committee. He will be responsible for details in connection with what is expected to be a highlight of the combined drive—the appearance of the Healthmobile on the floor of the NAC-TESMA-TOA Second International Trade Show, and at the joint meetings of TESMA and TEDA preceding the Trade Show this month at the Americana Hotel, Bal Harbour, Florida.

The Healthmobile, which is completely equipped with X-ray equipment, will offer its facilities to chest X-ray every person in the area connected with the motion picture and theatre business. Services are free of cost.

X-rays will continue throughout the convention, with Hospital maintaining a booth near the registration area of the Trade Show to register those who wish to avail themselves of the free chest X-ray services, and to explain the services and facilities of the Hospital.



## NATIONAL THEATRE

*(Continued from page 29)*

picture since the angle of projection is slightly positive.

It has been considered that some form of TV projection may be required sometime in the future.

The following projection data covers the main theatre:

*35-mm Projection and Sound*

1.33/1 Silent 16 frames per second.
1.33/1 Silent 20 " " " .
1.38/1 Sound 24 " " " .
1.66/1 " " Widescreen.
1.75/1 " " Metroscope.
1.85/1 " " VistaVision.
1.75/1 " " VistaVision.
2.00/1 " " RKOScope.
2.35/1 " " CinemaScope.
2.55/1 " " CinemaScope.
3-D Projection.
Unmarried Prints.
Optical Track.
Magoptical.
Four-track Magnetic Stereophonic.
Single, double, or triple magnetic tracks to CinemaScope track positions.

*16-mm Projection and Sound*

1.34/1 Silent 16 frames per second.
1.34/1 Sound 24 " " " .
2.68/1 " " " " " .
Optical Track.
½ Stripe Magoptical.
Full Stripe Magnetic Track.
Edge Stripe Magnetic Track.

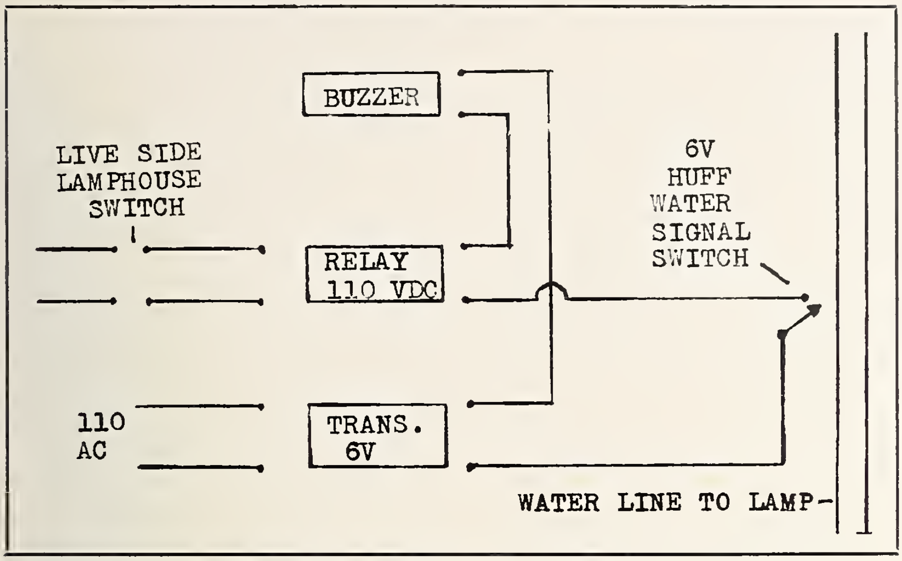
Projection data for the preview theatre:

35-mm as for main theatre, plus rear projection at 1.38/1 on one projector without stereophonic sound.
16-mm as for main theatre, plus recording facilities for all magnetic tracks.

Well-equipped club rooms, offices, and general service rooms surround the auditorium.

What future is in store for this unique type of theatre has possibly been best summed up by R. F. Scott, Planning and Design department, Rank Precision Industries, Ltd., who had a large hand in the designing of the building and installations: "We must wait and see whether the National Film Theatre will create a new tradition in design. It will, I am certain, form a basis for realistic thought, and not a little argument. However, from a technical point of view it will certainly fulfil all the many requirements laid down by the British Film Institute."

## POSITIVE ALARM SYSTEM FOR WATER-COOLED JAWS




Schematic for a positive alarm for water-cooled jaws submitted by Harvey H. Freed, projectionist at Loew's State Theatre in Newark, N. J., and a member of IA Local 244. The whole assembly is mounted in a 6 x 6 electrical box, or smaller if a 6-volt supply is used from the projection framing light transformer—or a separate 6-volt bell transformer can be used. The relay is a Guardian Series #200-110 D (Universal). It works from 30 volts to 110 volts DC. Freed states that he has found this system to be very satisfactory.

### Lachman on Overseas Jaunt

Ed Lachman, president of Carbons, Inc., has been on a three-week tour of Europe in connection with his primary purpose of attending the annual reunion of Lorraine Carbon representatives of the Societe le Carbons Lorraine—of which Carbons, Inc. is the sole distributor for the Lorraine Orlux Super-Charged Carbons. His itinerary included Berlin, Frankfort, Rome, and Paris.

Lachman addressed the entire body in Paris, the focal point of the activities, and observed the newest developments at the France Lorraine laboratory in Pagny. Highlights included visits to every theatre in available cities, including a side trip to the first bi-lingual drive-in outside of Rome.

On his return trip, Lachman was accompanied by a group of Lorraine laboratory technicians who serve as consultants to European exhibitors. Purpose of the U. S. trip is to exchange with American lamp manufacturers the latest information on the projection set-ups and requirements of theatres on the continent as they relate to the increasing use of American-made products.

Lachman is appearing at the TESMA-TOA convention in Miami to give delegates a first-hand report on the most recent developments in applications and methods of obtaining maximum projection light with the use of Lorraine arc carbons.

### Bert Ennis Resigns From Altec Service

Bert Ennis, director of all publicity and promotional activities for Altec Service Co. and Altec Lansing Corp. has resigned that post to devote his time to finishing his contracted volume on the late Samuel L. Rothapel, Herbert Lubin, and Arthur H. Sawyer, who created and built the Roxy Theatre.

Ennis' efforts are credited to a considerable degree with obtaining recognition of stereophonic sound. He also created the Altec Promotional Caravan, a mobile unit that toured the United States exploiting stereophonic.

The former public relations expert had an extensive career in that field as a publicity executive for Columbia, Paramount, Roxy Theatre, and numerous stage and screen stars.

### Films Make 18-Mil

The film industry netted $18.077.000 for its stockholders in the last eight months. higher than the $17,761,000 take for the same period last year. Most companies reported dividends identical with those of the comparable period in 1956.

### Answers to Projectionist Exam

| | | |
|---|---|---|
| 1. (A) | 5. (C) | 9. (C) |
| 2. (B) | 6. (B) | 10. (B) |
| 3. (D) | 7. (D) | 11. (D) |
| 4. (A) | 8. (D) | 12. (C) |

## PROJECTION ROOMS

(*Continued from page 15*)

and mistakes are frequently made in their design, resulting in a restricted air-flow or an uneven distribution of draught between the two projectors. If it is not possible to have a separate vent for each arc lamp, the main vent pipe serving both lamps should not be horizontal in any part of its course, but run obliquely upwards towards the outlet. It should not be necessary to point out that a common vent must have a larger diameter than two branching flues.

Variations in the draught caused by changing wind conditions can be regulated by a damper, which is built into the housing of all good arc lamps. If this is not the case, a regulator should be provided in each of the two outlet flues; otherwise the arc will burn erratically. If for structural reasons the main outlet flue is of considerable length but possesses little elevation, it will be necessary to provide a small exhaust fan within the pipe to ensure the removal of the exhaust gases.

The projection room should be decorated in colors which are fairly light, without being so bright as to cause noticeable reflections. A medium hue, with an absorption factor of approximately 50 per cent should prove suitable. Great care should be taken to ensure that neither the decorations nor the equipment itself harbors dust, which is not only detrimental to the valuable apparatus but even more so to the delicate film.

Since the projectionist requires exceptionally well-illuminated working conditions, some adjustable form of lighting should be installed near each projector. This will enable him to inspect any part of the machine and the lamp can easily be swung out of the way when not required. For the general illumination of the projector room only incandescent bulbs should be used, which should all be enclosed in either wire baskets or glass globes. It is advisable to provide the projection room and especially the workshop with mains plugs, as these will always be in demand.

Fire precautions are an essential consideration in the planning of a projection room and its equipment. The door and window openings should be fitted with fireproof canopies consisting of non-inflammable material. This canopy should overhang 50 cm into the room, with a 30 cm overlap on either side of the door or window. This precaution is only necessary where there are window openings in the immediate vicinity or the adjoining structural material is inflammable.

In the event of a fire, excess internal pressure builds up rapidly and must be released. For this purpose a lightly built and automatically-opening excess-pressure window should be installed; this may be situated in any other room so long as it is directly connected with the projection room. This window should be made of ordinary window glass and must be at least 0.25 sq. m in area. As locks and bolts on this type of window are forbidden by law, wire mesh or a steel grille can be used as a precaution against burglary.

### *Note: Water Supply*

If at all possible, the projection room should be provided with an adequate water supply. This is a necessity when water-cooled projectors are employed, and is also of great assistance in ensuring clean working conditions.

Of course, the electrical installation must conform to the requirements of the local authorities. Apparatus not requiring constant attention, such as

**Are You Moving?**

If so, please notify us one month in advance. The Post Office does not forward magazines. To avoid delay, please cooperate by sending us both your *new* and *old* address.

the gramophone, curtain control, switchboard for house lights, dimmers, etc., should be situated so that the minimum movement is necessary for their operation; if possible, they should all be operable from one place.

Moreover, the control loudspeaker should also be reasonably close to the projectionist, so that he can keep a constant check on the tone, without the distraction of extraneous projection room noises. Furthest away from the projectors should be those items of apparatus which are only used at the beginning and end of a performance. The arc lamp rectifiers, amplifiers and ventilation plant are best placed in an adjoining room.

Of particular importance is the rewinding equipment, and although this is in constant use it should be placed at some distance from the arc lamps, as a protection against fire. The film storage cabinet is best situated near the rewinding bench; if possible directly over it.

The modern projection room should be spacious and airy; the apparatus, both that in the actual projection room and that in the adjoining rooms, should be so arranged as to be fully effective. A rational layout will be of immense assistance in helping the projectionist to attend to his task without hindrance, so that he can give his full attention to ensuring impeccable sound and image quality.

## HI-SPEED INTERMITTENTS

(*Continued from page* 10)

flicker begins to be perceived at a brightness level between 5½ and 6½ footlamberts according to a number of authorities including Marbe, Arndt, Nickerson, and Kellogg. Reducing the width of the blades to 60° raises the flicker-perception level to 7½—9½ footlamberts for the same cutoff frequency. Because these values reveal that 60° or 63° shutters passing 1.3 times more light produce exactly the same flicker effect as 90° shutters, use of 5-to-1 intermittents raise picture brightness 1.3 times *without increasing flicker!*

### *Hi-Speed Performance*

Projectionists who have not yet operated with 5-to-1 intermittents want to know whether high-speed movements are noisier in operation than conventional 3-to-1 movements, or produce any degree of picture unsteadiness. What about the life of the prints, and what about the matter of gate tension?

The Simplex X-L Hi-Speed intermittent is quiet in operation; that is, the movement itself cannot be heard when the projector is run without film and with the gate door open. This is because the pinwheel-and-star portion of the movement is identical with the standard X-L movement. For the same reason the Hi-Speed intermittent gives the same rocksteady projection to be expected of any high-precision geneva movement. The Hi-Speed slipper-block accelerator mechanism produces no noise, no vibration, and does not affect the star-and-pinwheel relationship.

There is, understandably, a small increase in noise when film is run in a projector having a Hi-Speed intermittent. This noise originates in the film loops which alternately increase and decrease in size 24 times each second. Every projector produces more or less loop noise; and with the more rapid film pulldowns effected by a 5-to-1 movement, the correspondingly more rapid changes in the upper and lower loops generate more sound than is heard with conventional intermittents. This increase in loop noise is nevertheless so slight that it is hardly noticed.

The more rapid film pulldowns require a slightly greater gate tension for both old and new prints. If 9 ounces is the standard tension for average prints in Simplex X-L mechanisms having conventional intermittents, the change to Hi-Speed movements normally requires the tension to be increased to 12 ounces, or 1.3 times the former gate tension. There is no need to employ excessive gate tension.

Long-continued film-wear tests conducted by the Simplex Equipment Corporation in Bloomfield, N.J. have failed to show any appreciable increase in sprocket-tooth or film-perforation wear with Hi-Speed intermittents. The projectionist need have no worries on this score. In fact, the projectionist who operates Simplex X-L mechanisms fitted with curved film gates and Hi-Speed intermittent movements may be confident that he is obtaining the very best quality of image on the screen—a quality noticeably higher than is possible with conventional "slow" intermittents in any projector, no matter how well constructed.

## MONTHLY CHAT

(*Continued from page* 5)

cannon across Spain.

Now there is a new weapon being brought into this civil war against TV which should interest the projectionist: the road show policy. In short, the features will get longer (if that is possible) and go legit (if that is possible). The two-a-day, reserved-seat policy is evidently based on the idea that Joe Doaks will stick by his TV receiver in Shickshinny, Pennsylvania, but when he comes to New York he will go into bankruptcy just to get two tickets to "My Fair Lady."

There's a catch in this policy: "My Fair Lady" happens to be a good show.

"They don't want good shows," says the exhibitor. "They want sex, they want rock 'n roll, they want science-fiction, they want gore." We say it's spinach, and we say the hell with it. The newly-adopted slogan for the motion-picture industry is "Get More Out of Life—Go Out to a Movie," a phrase that deliberately avoids the nauseous superlatives that generally come down the pike.

We agree with the idea that a movie can give you a lift, even sometimes, so help us, A Message. But our idea of getting more out of life is not an hour and a half of werewolves or Elvis Presley. (Sorry, girls.) The quick answer to that is that it's the teen-agers who comprise the majority of movie-goers, and the exhibitor must cater to them if he wants to eat. That may be true; but if all you're going to do is concentrate on one age group, you're missing a large segment of potential audience.

This sounds more like a harangue than a chat, and somewhat afield from projection. But we must of necessity recognize the fact that what is good for one part of this industry is good for all. Somewhere along the line motion pictures and TV are going to have to live side by side amicably. Certainly technically both industries have advanced greatly. Certainly there will always be a need for the technician, although his job may not exactly look like the one he has now. As we have said, we do not know the answer. If it is a process, fine. If it is a policy like roadshow, fine. But to date we are drifting.

There is a legend that Chopin was inspired to write his "Minute Waltz" after watching a puppy chase its tail around the parlor. The motion-picture industry has been chasing its tail, caught it, and bitten it off.

But no inspiration; no music.

### MPRC Chooses Officers

Officers and directors for the coming year were chosen at the tenth annual member company meeting of the Motion Picture Research Council in Hollywood. Renamed chairman of the board is Frank Freeman, as was his vice-chairman, William Mueller. Farciot Edouart succeeds William Kelley as secretary. Kelley has been named treasurer and executive director.

Directors appointed are: Les Sansom, Allied Artists; Gerald Rackett, Columbia; Ub Iwerks, Walt Disney; Douglas Shearer, MGM; Farciot Edouart, Paramount; Dan J. Bloomberg, Republic; William Englington, RKO; Sol Halprin, Fox; Alexander Golitzen, Universal-International; William Mueller, Warner Bros.

Frank Freeman and Morris Weiner were named additional board members to represent producing companies.



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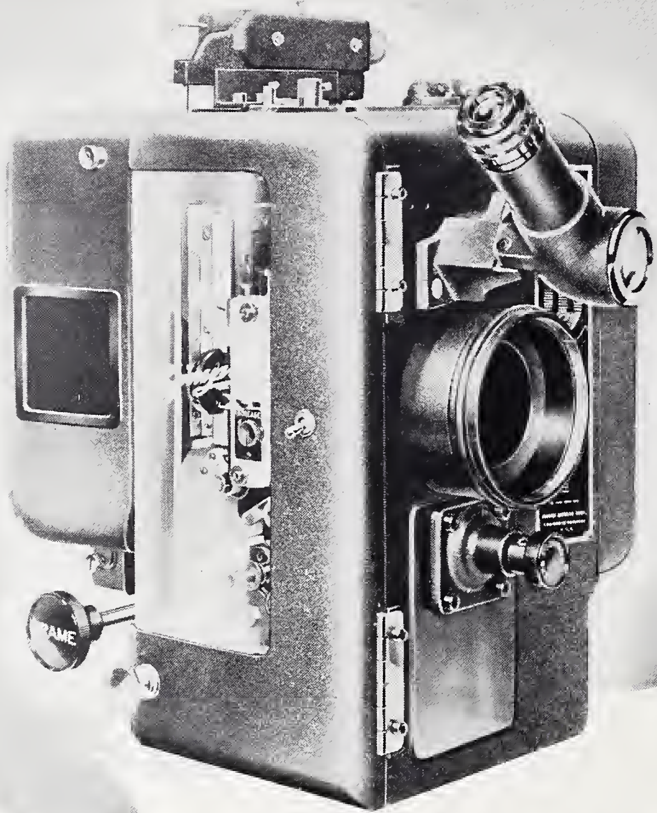

# INTERNATIONAL PROJECTIONIST



DECEMBER 1957

VOLUME 32 • NUMBER 12

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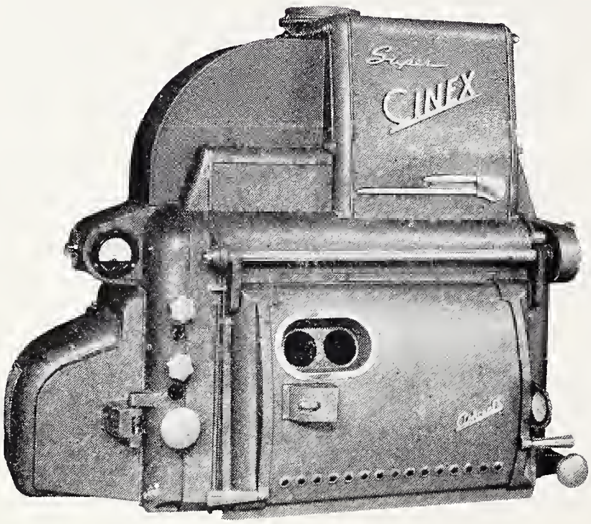


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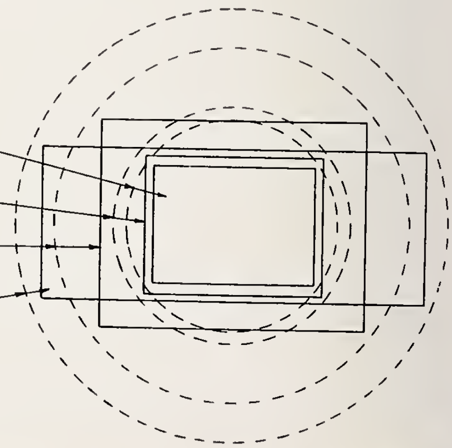

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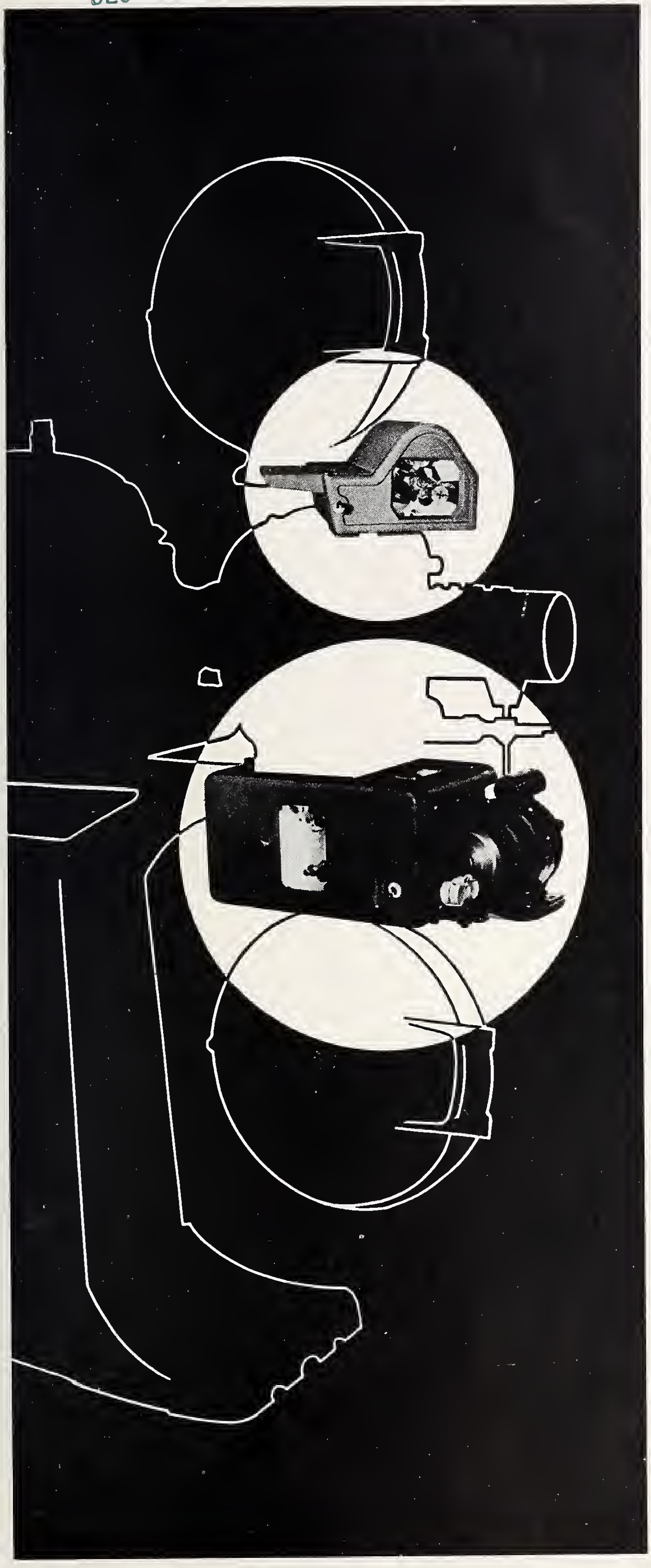

# International PROJECTIONIST

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ROBERT C. MacLEOD, *Editor*
R. A. MITCHELL, *Contributing Editor*

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# *Monthly Chat*

## Variations on a Holiday Theme

AT THIS TIME of year, you can bet your depreciated dollar that practically every editorial column is going to reflect the pipe-in-mouth editor leaning back and musing . . . "Well, what kind of a year has it been?"

We're darned if we know.

It's been a year that has, through the trumpet-sounding of thousands of publicity releases, seen the advent of pay TV. And much more quietly, it was found that a good many weren't buying it. Particularly in the upper brackets where they can afford it. They, undoubtedly, are doing other things with their money, but this industry is still wondering what.

It's been a year when an inexperienced amateur (female) projectionist at one of those specialized artsy-craftsy houses ran an abstract avantgarde movie upside down and backwards—and the audience never knew the difference. Considering some of the legitimate product lately, there may be something in that.

A dog, with more publicity than Rin-Tin-Tin and Lassie put together, got sent into an endless orbit. Consequently, you may expect an endless orbit of programmers about dogs off into the wild ionosphere yonder. The dog was painlessly done away with. Would that would happen to those types of programmers.

It was a year of beguiling teenagers into theatres, then calling the cops to beguile them out again.

### *And a Happy New Year to You*

The real accomplishments of the year, like most real accomplishments, are going through a stage of mature development. There has been an increasing pattern of roadshow policy. And, from the gross records, it has worked so far. But the pictures that have been making it hand over fist by roadshow have been ultra-quality product. By the law of averages, there has got to be a turkey come along sometime that's going to ask for high prices and reserved seats, and the patrons are going to ask for someone's head.

There has been the usual dark brown pessimism with the accompanying witch-burning, and also the false hearty optimism. Both are as tinny and hollow as the majority of movie ads. TV has been in trouble, and it has been admitting it. There is an honest opportunity for the motion-picture industry to pick up a good deal of lost ground—if all the various factions of it manage to get together and bury the hatchet. And not in each other's heads.

To coin a phrase, projectionists are projectionists. They are, by and large, an experienced lot. And like experienced lots, they have a tendency to express their opinions in blunt terms.

And so it is that the main interesting thing about this year is that it leads into the next, when we shall hear some blunt opinions about what has been developed in these past fast-flying twelve months.

God rest you merry, gentlemen; let nothing you dismay.

INTERNATIONAL PROJECTIONIST

Volume 32 DECEMBER 1957 Number 12

By ROBERT A. MITCHELL

**No matter what advances manufacturers make in the field of projection, there is always the fact that a new problem lies just around the corner; here is an old problem dissected.**

# SIDE-WEAVING: A Common Defect of Projection

MANUFACTURERS of theatre motion-picture projectors exert every possible effort to eliminate up-and-down picture jumping by constructing their intermittent movements of accurately made parts. In fact, the intermittent movement receives the lion's share of attention in the construction of any theatre projector.

Two particular parts of the geneva-type movement, the starwheel and pinwheel (cam), are commonly made to tolerances slightly smaller than 1/10,000 of an inch (0.1 mil=2.54 microns). Tolerances as close as this are extended by the more conscientious manufacturers to the starwheel shaft and the intermittent sprocket which is affixed to it.

Notwithstanding the fact that the sprocket. itself. is much too often the weak link in the "chain" of parts effecting intermittent film transport through the projector gate, vertical unsteadiness of theatre movies has been reduced almost to the vanishing point. We repeat our opinion that intermittent sprockets should be made of nothing but tool steel, and ground *after* hardening.

There is thus little excuse for an up-and-down jumping and dancing picture. Professional camera negatives are usually perfectly rocksteady, forasmuch as the widely used Mitchell camera employs a high-precision claw movement with registration pins. Picture jump, when it occurs, is usually the fault of either the release-copy printer or the theatre projector.

On the whole, however, present-day theatre movies are so rocksteady in the vertical direction that *horizontal* weaving of the image from side to side on the screen becomes very noticeable. Now, sidewise weaving is very different from vertical jump from the mechanical point of view. No complicated gearing is involved, and hence no relationship between manufacturing tolerances and sidesway can be established.

### Neglect of Sidesway Problem?

For these reasons many manufacturers of motion-picture projectors have largely neglected the problem of sidesway, and have provided little more than a flanged guide roller which permits the picture to be centered laterally. The action of a single guide roller at the top of the gate casting is not nearly so effective a preventative of side-weave as is sometimes thought.

The present state of affairs in regard to side-weave is admittedly unfortunate. Modern color films are so very often photographed and processed with such great care that their presentation is ruined by image unsteadiness *in any direction.* The use of CinemaScope films actually doubles the amount of sidesway present, as anamorphic lenses having an expansion factor of 2 double the horizontal magnification of the image. The advent of CinemaScope has, in fact, made the presence of sidesway painfully evident.

Side-weave has always been a common projection defect, of course, but it was easily ignored in the early days of the art. Jumpy pictures were the rule before the 1920's, hence slight horizontal weaving of the projected images could not always be perceived. But with the use of more accurately made intermittent movements, sidewise weaving of the picture exceeded vertical jump in range of movement, and accordingly became quite a

nuisance. Sidesway was a source of complaint even before the commercial introduction of CinemaScope!

### Old-Style Flat Gates

A rather large range of horizontal image movement can be expected of projector mechanisms having old-style flat gates with only a single lateral guide roller at the top of the gate. This does not mean that *only* old-style projectors produce annoying sidesway. however, for several modern projectors, particularly those made in Europe, have similar primitive film gates without additional means for insuring weave-free lateral guiding of the film at the aperture. Even the old Simplex Regular and Super Simplex gates, familiar to all American projectionists, and essentially unchanged since 1910, have the advantages of an effective and easily adjusted lateral guide roller with flanges of large diameter.

Lateral film guiding in cameras, printers, sound recorders, and projectors involves the maintenance of a fixed lateral position of *one edge* of the film—the so-called "guided edge," which is the edge nearest the soundtrack. Standard film may vary in width from 35.01 mm to 34.95 mm. depending upon manufacturers' film-slitting tolerances, while a maximum degree of shrinkage in triacetate safety film of good quality (0.2%) results in a possible minimum film width of 34.88 mm. It is therefore easy to see that the edge opposite the guided edge changes its lateral positioning within an overall range of 35.01—34.88 = 0.13 mm when constant placement of the guided edge is successfully maintained.

### Correct Guiding

Failure of lateral film guiding in cameras, printers, and projectors inevitably results in picture sidesway.

The guided edge of film threaded in a projector is the edge nearest the projectionist as he stands at the "operating side" of the machine. It will be noticed that the guide-roller flange on the operating side is fixed, i.e. it cannot move in and out on the guide-roller shaft. The opposite flange, on the other hand, is able to slide on this shaft, and is made to press in upon the non-guided edge of the film by a small coil spring. The gentle pressure afforded by this spring is sufficient to hold the guided edge of the film



against the inner surface of the laterally immovable guiding flange of the lateral guide roller.

The film at the guide roller, it may be assumed, is laterally very steady and exhibits little or no sidesway. Unfortunately, however, this desirable fixity of the film's lateral positioning does not extend down to the aperture, which is placed several inches below the guide roller. Why does the film fail to maintain lateral steadiness during its passage through the gate?

The film is able to move from side to side upon the face of the *revolving* intermittent sprocket. In fact, there is more film sidesway at the sprocket than at the aperture, which is located between the intermittent sprocket and the lateral guide roller.

The range of sidesway upon the intermittent sprocket is limited by the sprocket shoe whose sides contact the edges of the film during its sidewise oscillations. *The flanged guide roller at the top of the gate is thereby forced to act as the "fulcrum" of sidesway, the flexible upper loop permitting the rapidly travelling film to oscillate back and forth above the guide roller.*

### Guide Roller "Pivot"

The guide roller, then, acts as a sort of "pivot" which allows the film in the gate to swing from side to side on the face of the revolving intermittent sprocket. Because the aperture is fairly close to the sprocket, the side-weaving movements of the film show up rather prominently on the screen.

Increasing the tension of the movable guide-roller flange does not reduce sidesway. Indeed, such an increase of pressure on the edges of the film may make matters much worse by buckling the film and causing the upper loop to flop. The film always has a tendency to "pinch out" at the guide roller when flange tension is too great. Flange tension should therefore be very gentle to steady the motion of the film as much as possible. Projectionists should not hesitate to reduce flange tension when the film is seen to flutter violently between the two flanges of the guide roller.

This is an especially important matter in the successful operation of Simplex Regular. Super Simplex, and Century mechanisms. It may not be possible to eliminate sidesway completely from these machines, but very much can be done to reduce it to the point where it is not too troublesome even during the projection of CinemaScope prints with anamorphic lenses.

### European Projectors

Certain European projectors are frequently criticized on the score of side-weave. As we pointed out, the film gates of many of these machines are rather primitive and do not permit the full advantages of superb European intermittent movements to be realized.

Even the most carefully constructed European mechanisms imported into the United States for special wide-film processes exhibit an astonishing absence of engineering judgment as regards the length and general design of the film gate. A gate having runners scarcely 3 inches long, and without large-flanged edge-guiding rollers, is obviously inadequate for the projection of 70-mm film. Wide-film Todd-AO showings are marred by a degree of sidesway far in excess of the amount which we are willing to accept in 35-mm projection.

Even though the projectionist himself, can minimize sidesway by careful adjustment of gate and guide-roller parts, the complete elimination of

this defect can be brought about only by the intelligent efforts of projector designers.

At least one English and two American manufacturers have attained the desired freedom from sidesway in their latest machines. The B.T.H. SUPA and Simplex X-L accomplish lateral steadiness of the picture with curved gates of correct mechanical design, while the Motiograph AA and AAA attain the same end with flat gates and sets of two flanged guide rollers, one above and the other below the aperture.

Previous to the introduction of these mechanisms, the use of "studio" guide rails represented a misguided attempt to solve the sidesway problem.

### Studio Guides

Studio guides, so called because of their employment in studio cameras, sound recorders, and other film-handling apparatus to insure constant lateral alignment of raw stock and freshly processed negatives and master copies, consist of two long rails which contact the edges of the film. In order to function as intended in spite of minor variations in film-stock width, the rail opposite the guided edge must be movable and spring loaded. The constant film-clearance width between the fixed guide rails of certain projectors cannot accommodate *both* unshrunken and seasoned prints.

First used in the Motiograph K of 1938, studio guide rails were superseded in the postwar Motiograph AA by the completely satisfactory double guide roller construction. Likewise, both the Simplex E-7 and the original flat-gate model of the Simplex X-L have guide rails, while the new curved gate for the X-L does not have them. Curvature of the gate mechanically isolates sidesway stresses in such a way that their effect is greatly minimized, hence little or no sidesway can be seen in pictures projected with Simplex X-L mechanisms having curved gates. Film buckle over the aperture is also reduced by the new curved X-L gates.

It has always been a mystery to us that studio guides should even have been considered for use in projectors! When they function properly, they automatically render the flanged guide roller at the top of the gate quite superfluous. And yet the guide roller is retained; and the projectionist must adjust it laterally so that the inner surface of the fixed flanged coincides longitudinally with the inner surface of the guide rail on the operating side.

The slightest departure from correct positioning forces guide roller and guide rails to work at cross purposes with the result that the film is positioned laterally by a condition of misalignment which can easily pinch the film and force it out of shape.

### Motiograph's Lateral Rollers

While Motiograph's two lateral guide rollers, one above and the other below the aperture, represents the most scientific solution of the sidesway problem by wholly obviating the lever-like oscillations of the film on the face of the intermittent sprocket, a similar and equally sound expedient involves a slightly underwidth sprocket and a sprocket shoe designed to guide the film laterally in the manner of a lateral guide roller. This particular construction has not yet been utilized in a projector even though its simplicity and obvious maximum effectiveness recommends it.

The longer the gate, the less the sidesway — a fact recognized many years ago by all projector manufacturers in the United States. The Powers was the only American projector having a short gate. A curved gate of normal length is equivalent to a flat gate many times longer, so far as sideweave is concerned. Pendulum-like sidewise oscillations of the film are greatly "damped" by a curved gate, which is the principal reason why the curved-gate Simplex X-L is free from sidesway.

During a recent visit to the Simplex factory in Bloomfield, New Jersey, the writer was shown a projected image of film perforations obtained by removing the aperture plate from the X-L projector. Not the slightest trace of sidesway could be detected.

### "Green" Print Problems

What sidesway-reducing precautions may be used to good advantage by projectionists operating on such older machines as the Simplex Regular and Super mechanisms? We recommend a simple, yet thorough, procedure beginning with the handling

(*Continued on page* 37)

**A neglected facet of good theatre practice has been the application of non-sync music in matching a film's mood.**

# Using Non-Synchronous Music As Good Showmanship

By JOSEPH HOLT

Member, IA Local 428, Stockton, Calif.

GOOD THEATRICAL practice demands new and varied methods of doing a job of entertaining the public. Perhaps in no category does the average film theatre fail so utterly to apply showmanship and ingenuity as in the field of non-synchronous music. Whether used for overture, intermission, or playout music, it is common to find the same approach that "anything goes."

It is our contention that actually little if any thought or preparation goes into the selection of accompanying music, but most often the selection is left up to the projectionist, and it is to him that we attune our comments in this article.

It is a sad fact that many projection rooms have the same turntable which was in use a quarter-century ago. Generally speaking, this means that the response and mechanical flutter and rumble are far from acceptable today.

In many cases, the purchase of a good quality table capable of a number of record speeds will prove to be a wise investment. Modern trends seem to lean toward 45 and 33 1/3 speeds, but certain discs are obtainable only in the older 78 speed, and will sound better if played back on the best modern equipment, which has been equalized in response to suit the theatre equipment and auditorium.

### *Matching the Mood*

Granted then that we may have available the proper playback turntable: should the responsibility of the projectionist there cease? The argument is often presented that if management does not look to the matter of supplying guidance in the choice of records to be used, then the field of choice is wide open by default. But a better view, it would seem, to promote better audience satisfaction, would be one in which an attempt would be made to select a record matching in mood the atmosphere of the film.

To illustrate, it would hardly be appropriate to follow a film which ends upon a dramatic or highly emotional note with a hearty rendition of "Jailhouse Rock," just to pick one at random.

But is it not just as ridiculous to precede or follow a comedy or a light musical with a choice Bach fugue? The reader may think the examples cited are extreme, and so they are: yet day in and day out the principle of compatible non-sync music is trampled by careless or indifferent practice.

Often the matter can be helped merely by calling the attention of management to the deterioration of the intermission music. Quite often, however, friend manager has other things on his mind and will delegate some member of the staff or a teen-age offspring to purchase a few new records. This results in some weird combinations and in extreme cases have caused the circulation of staff petitions for the projection room to manage somehow to break or lose records.

Our point still is simple: one must be careful to select the music which will complement the film program.

Let it be supposed, then, that management has asked our advice in the matter of the selection of replacement records. Some of us may have very good ideas or at least most definite likes and dislikes in the matter of music, but it is possible that most projectionists will want to bow out as musical supervisor.

*Billboard*, an amusement weekly, devotes considerable space to popular music. Rating charts on albums and single discs indicate general suitability for various purposes. Armed with a list such as "Albums Most Played by Disc Jockeys," the prospective theatre music buyer is prepared to approach the record store. Careful auditions of the records will indicate which are worth further consideration or purchase.

### *Use of Pre-recorded Tapes*

Tape playback devices have not been accorded the use in theatres which they have in broadcast work. This in itself is surprising, for tapes will provide perhaps two or three times as many good playbacks as the best disc equipment. Pre-recorded tapes are available, and many of them are eminently suitable for theatre work.

Many areas provide frequency modulation stations which play long intervals of high-quality music without the interruption of commercials or station identification. The theatre may choose to make off-the-air recordings on tape for its own use. We do not propose to discuss the matter of copyright and performance rights in these off-the-air tapes. We intend merely to indicate the manner in which tape recorders may be used to great advantage.

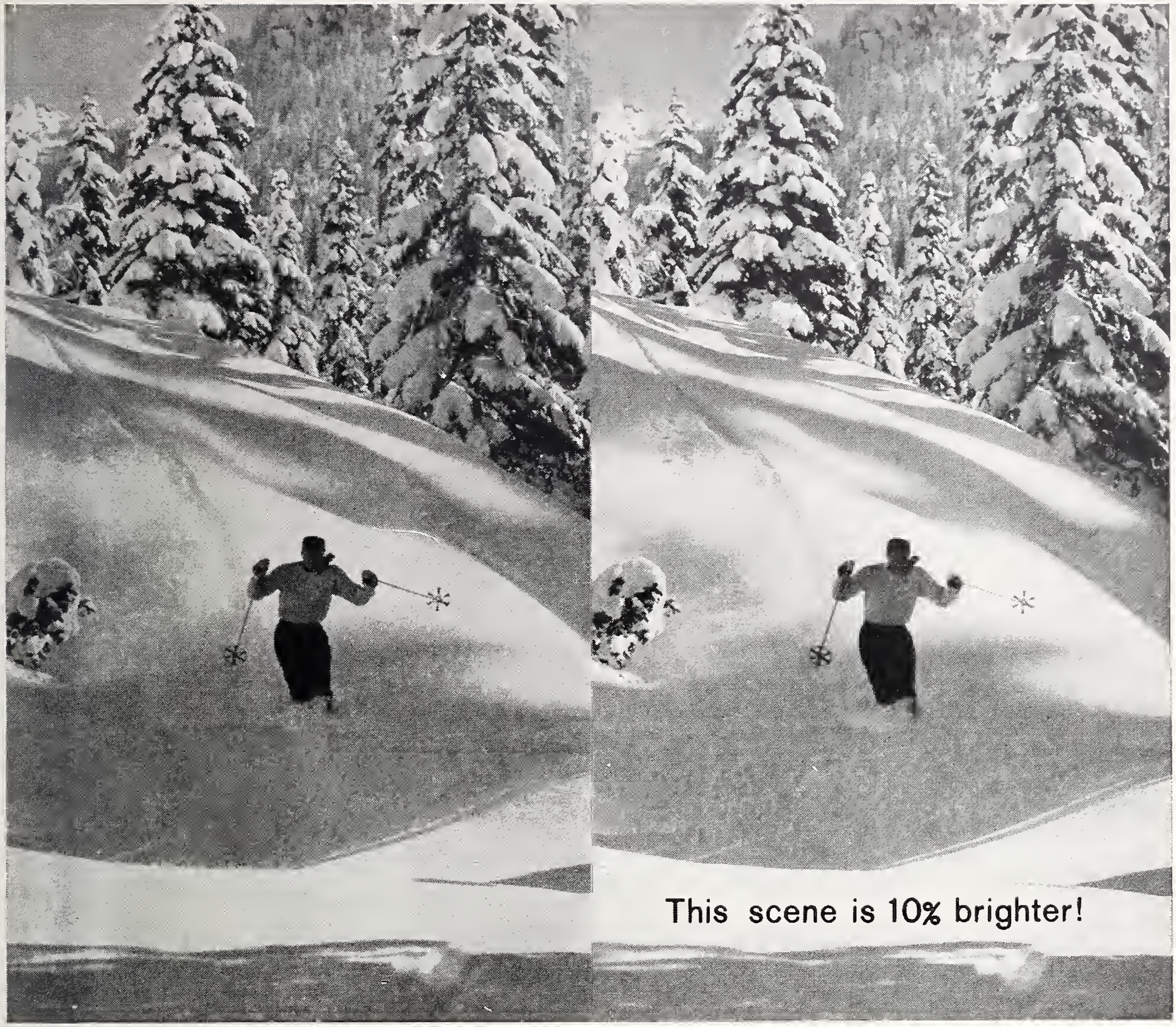
Another type of recording which has been little used is the binaural tape or disc. Each of these may be introduced into extreme stage left and stage right speakers to provide astonishingly improved reproduction.

Binaural records are not so reliable as the two-track tapes, and the writer cannot view without alarm the troubles which may result from improper track-

(*Continued on page* 38)

## A Musical Note

As author Holt admits, his examples of what music *not* to use are a bit extreme, but there is no denying that non-sync music has not always been too appropriate. In this connection, it might be pertinent to note that there are a number of albums on the market that are specifically designed for just pleasing, non-prepossessing music—nothing more. Any one of the selections would not, at least, detract from the picture's mood. There is not space here to give a list, but Mantovani, Morton Gould, Jackie Gleason, and Andre Kostelanitz come immediately to mind. There are, of course, many fine albums of organ intermission music. One of the best of these is the high fidelity recording of George Wright.

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**American projectionists, long used to electrical changeovers, will find of interest this account of the development of such a system overseas, where mechanical changeovers are prevalent.**

# Electrical Changeovers For English Projectors

By ALBERT BUCKLEY

TO A BRITISHER, well versed in technical happenings at both sides of the Atlantic, it would seem that over here we have not had that stability in changeover systems that has been the case in the United States. Up to the post-war era British projector manufacturers had not at any time in their long history allowed provision in their designs for some standard electrical or mechanical changeover, assuming that such accessory could have been available. As a result, some difficulty has always been present in certain projectors relative to the fitting of electrical or mechanical changeovers.

With the possible exception of a number of London cinemas, and the key Paramount Theatres in principal British cities, no electrical changeovers were in use prior to the war period. The Thide changeover, made by the Dowser Mfg. Co. in the United States was the only one available, and that type was only suited to the Simplex projector. Today, the prohibitive cost of the British-made Thide has almost ruled it off the market.

### Manual C'Scope Changeover

Prior to 1931 no standard changeover device was available on the British market. In that year a very clever mechanical job was introduced under the name Easifit. This device employed small, thin, spring-controlled fly-out shutters, coupled together by Bowden cable system*. Practically every cinema over here used that type. In the same year a very simple and efficient device was produced by the writer; this cost about three dollars and functioned for several years without trouble. As time went on other equally simple mechanical devices were used, but no attempt was made to market the ideas.

* Bowden cable, named after the maker in England, consists of a stranded steel inner wire and an outer sheath of spiral formation, covered by a plastic face. Used mainly for cycle brakes.

The introduction of CinemaScope demanded a new type of shutter in most instances. As the immediate answer to this problem one rather unwieldy type made its appearance on the market. This job fits on the front wall of the projection booth and is operated by a large handle in conjunction with twin piano wires. Although many of these changeovers are in use over here they can hardly be considered as efficient as a small shutter operating close to the film aperture, or even a larger shutter, say up to 5 inches x 4 inches, operating between the arclamp and projector.

CinemaScope problems present no difficulty in the post-war models made by BTH and Gaumont-Kalee, for most of these models have integral electric, or electro-mechanical change-overs. In the BTH job, small twin fly-out shutters are used; these are extremely efficient but will not fit any other make of projector. Incidentally, picture and sound changeovers are interlocked and one press button does the trick.

In the Gaumont-Kalee models a novel principle is used. The fire shutter acts as both fire shutter and changeover shutter. The shutter is opened by mechanical means and closed electrically: an AC solenoid pulls against the mechanical pull, and thus one solenoid is always energized. (The system works all right, but in the writer's opinion it is far better to have a momentary current through the solenoids and operate the shutter both ways by electrical means. There are no heating losses, and the wire gauge can be much smaller.) Both these ideas whilst quite efficient in manufacture and operation present a narrow-minded viewpoint far removed from any attempt at standardization.

(Ed. Note: *Mr. Buckley, English motion picture engineer, designer, and manufacturer, recently visited the United States to observe American equipment which is difficult to obtain in Great Britain. In exchange, we have here his description of the trial-and-error process that brought about his changeover system, the only standard electrical changeover in the British Isles.*)

### Trial and Error Experiments

Three years ago a casual enquiry from the projection department of a large Yorkshire cinema interested the writer so much that he decided to design and make up at least one set of electrically operated changeovers to suit the [Century] Westar projectors at that cinema. Since no elaborate toolroom or other manufacturing facilities were available, it was most essential to use only parts that were readily available.

Much experimenting was done to find coils of suitable dimension and capacity to operate on 110 volts AC, and to give a maximum movement of 2¼ inches to the plunger. Text books do not often offer much in the way of formulae, and many writers advise trial and error in respect to solenoid operation. Finally, it was found that a plunger made of ½-inch round soft iron or mild steel, and 3¼ inches long was ideal in combination with two adjacent coils, each 50 ohms in resistance and 2 inches long. The plunger gave the maximum movement that would ever be required.

In order to use standard materials as far as possible it was decided to employ a ⅝-inch o. d. brass tube for the plunger to operate within, and since the only available coil formers had bores of ¾ inches, the opening and closing coils were cemented together and fitted to the brass tube by phospher-bronze rings. (Later models

use a long cooper sleeve to which the two coils are cemented. This fits over the brass tube containing the plunger.) Subsequently, it was found that these coils and plunger would give an effective movement down to 1 inch.

In the units fitted to the Westars, the plunger movement was restricted to 1¾ inches, the connection between the plunger and shutter being by Bowden cable. The early solenoid units were mounted within standard 2-inch electrical conduit—cut to length and fitted with solid, machined end pieces.



Thanks to American planning, the fitting of the Westar projector proved very easy for here was a projector with provision for a changeover shutter, and there was no resort to "trickery" to produce a successful mechanism. In the first few weeks of making these rather primitive but effective units, no thought was ever given to the idea of making up changeovers for projectors other than Westar; it was merely decided to make one model and sell it under the name of Zippa. However, necessity is the mother of invention and, since certain orders were available if Zippa units could be modified to suit other projectors, the writer decided to go ahead with plans on these lines.

### *First, the Kalee 12*

The first machine to be so dealt with was the Kalee 12 which bears some prominent resemblance to the German Ernemann-drum shutter—totally enclosed mechanism, etc. Happily, and luckily too, a suitable recess exists immediately behind the long aperture plate. This plate carries two apertures: one for projection and the other for framing up the film. In order to permit the use of any shutter in this position, it is essential to cut a circular hole in the shutter to permit framing the film when threading. Also, in order to clear magnetic soundheads—if fitted—and the upper film loop, it is necessary to make up a rather weird shutter adjustable in every possible direction to prevent binding in the slot, and to permit free operation.

On the Kalee 12 the solenoid unit is mounted vertically at the non-operating side of the projector, and a cable length of 24 inches is used. Since in the above machine a total shutter movement of one inch is necessary, a short brass limit tube is placed at each end of the plunger, one on the brass handleshaft and one on the cable. Similar brass tubes are used in all the units except for the wide aperture sometimes found in Westar.

Inspired by the success of the Kalee 12 conversion it was decided to go all the way and fit other projectors.

The Ross projectors were the next to receive the "treatment" and one change-over unit suits both models. Ross have made two popular models in recent years; the "F.C.", and the "G.C.". The former uses a rising and falling mechanism to secure a fixed optical centre, and the latter employs a rotating intermittent box like in the Simplex.

On both these machines the only possible place to fit a changeover shutter is the existing fire shutter slot. The fire shutter is of heavy construction and is operated by governors similar to the Simplex. It was decided to take out this shutter and replace it with a thinner fire shutter and a changeover shutter, both operating in the same slot. These shutters are of pickled metal 18 s.w.g. (British standard wire gauge) thick.

### *Changeover-Fire Shutter*

As the fire shutter operating arm normally projects right through the slot, this arm has to be cut so that it does not even enter the slot—to leave a clear path for the changeover shutter. The solenoid unit is mounted by two arms to the rear shutter casing and does not interfere with the removal of the shutter casing cover; it is mounted at an angle of 30 degrees to the horizontal. This device has worked very well—indeed the famous Granada Theatres have already fitted a number of their Ross projectors with it.

No special difficulty was experienced in fitting the Simplex projector although the removable light spot box does not help in designing something of this nature. Early models of the Zippa employed Bowden cable operating within a rigid steel bent tube, but later models were modified to use a bell crank lever similar to the Thide. Incidentally, it was found that one could not improve the design of the Thide at least where Simplex projectors are concerned.

The Kalee 8 and 11 projectors—both models obviously inspired by the German Ernemann design in the first instances, although considered obsolete even in 1939—are still running in many cinemas. Many of these projectors have been running well over twenty years with no overhaul, and no replacements apart from the superficial items: sprockets, film trap parts, rollers, etc. These machines have heavy

cast film trap units with a deep circular aperture 1½ = inch diameter, and many different specimens of these two models exist. (The degree of

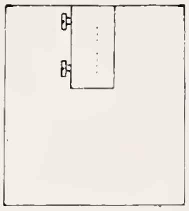

FIG. 1. Westar shutter.

standardization so thoroughly exploited in the Simplex range up to the E-7 has always been completely lacking over here). Consequently it was necessary to use some standard shutter capable of being fitted to each

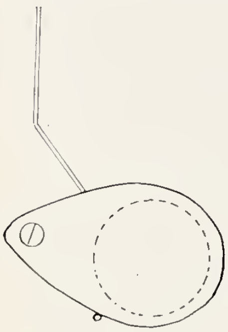

FIG. 2. Shutter for Kalee 8 and 11 projectors.

distinct version. That type proved to be an egg-shaped shutter, pivotted at one corner and operated by an ordinary cycle wheel spoke!

### *Fitting the Kalee 11*

The problem of fitting Thide changeovers to a Kalee 11 confronted the writer some ten years or more ago. An important client wanted electrical changeover fittings, and Thides were the only ones to be purchased. Egg-shaped shutters were employed,

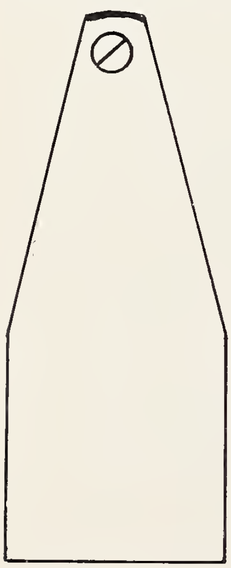

FIG. 3. Simplex shutter.

as now with the Zippa job, and the Thide units were mounted at the top of the projector at right angles to the optical axis!

Figures 1 to 6 show typical shutters.

In order that these solenoid units may be used with any likely voltage to be met in practice, the British 200-250 single-phase lighting voltage (being slowly replaced by a standard 240-volt system) or the 110 volts often used in

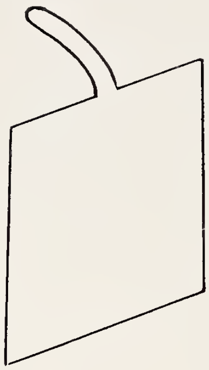

FIG. 4. Ross fire shutter.

connection with American sound equipment which is obtained through a static transformer in every case, special pre-wired 12-way connector strips are used. Thus the installation en-

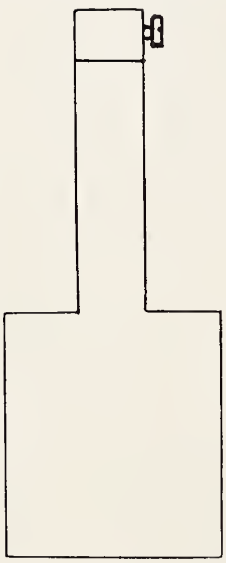

FIG. 5. Ross changeover shutter.

gineer needs only to carry one of each terminal strip to cater for any likely voltage. The strips are wired in red

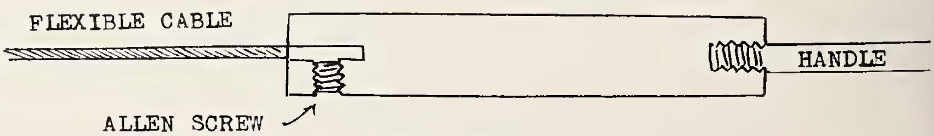


FIG. 9. Plunger

sleeving for the higher range of voltages, and in black for the lower range.

On the 200-250 volt strip the opening coil on one projector is connected in series with the closing coil on the other one. The coils on the lower

FIG. 6. Shutter for Kalee 12.

range are connected in parallel. Thus each coil receives between 100 and 125 volts across it; the wire gauge

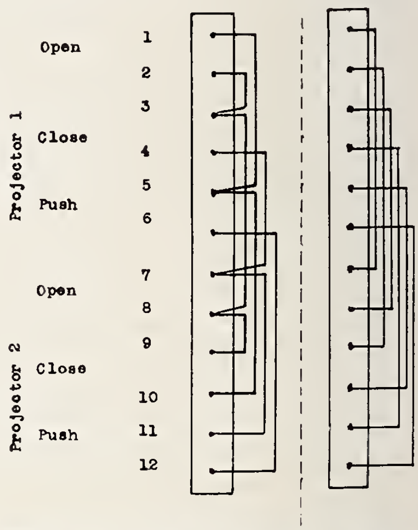


FIG. 7 (left). 110-volt connector. Mains to terminals 2 and 12. FIG. 8 (right). 200-250 volt connector. Mains to terminals 1 and 12.

will easily stand a momentary current of more than twice the normal amount. See Figs. 7 and 8.

### *Three Forms of Control*

Since the requirements of theatres vary, three forms of control are used:

(1) Twin finger pushes to each projector (this enables the projectionist to effect change-over right to left, or left to (*Continued on page* 34)

**Electricity is no stranger to the projectionist—his craft depends upon it. But electronics—a more important facet—sometimes is. Yet not only does the projectionist depend upon electronics, but, in a technical sense, so does it depend upon him. Acknowledging that some concepts of electronics change almost with each morning's headlines, this series is based on the premise that the projectionist's future will be affected a great deal by the changes. Although there does not seem any particular need for a "basic refresher," a knowledge of the fundamentals behind recent developments in electronics would seem necessary—but their practical applications are considered to be more important here.**

# What Is ELECTRONICS?

By JOHN SEARS

## I. Some Atomic Theories

A KNOWLEDGE of the fundamentals of electronics is not necessary to use electronic materials; 11-year-olds are putting together complicated hi-fi set-ups with do-it-yourself kits. But for the professional or amateur technicians, fundamentals are mandatory.

Although this series is not intended to dwell on primer physics, and it is downright discouraging to think of steak, champagne, and your favorite girl as just another conglomeration of atoms, a beginning must be made somewhere. And that beginning—in line with modern theory that all matter is electrical in nature—is with the atom.

The ancient Greeks were highly advanced in the arts, but they were somewhat shaky on electronics, because, ironically enough, the word "atom" is derived from the Greek *atomos*, meaning something that cannot be divided. "Electronics" also has its origin in Greek—from *elektron*, meaning amber, because the Greeks noted the magnetic effect produced in that substance by friction. Later on, all matter with magnetic properties came to be known as "electrics," and so on. Still, the Greeks had a primitive sort of atomic theory that matter was composed of infinitesimal specks—but they thought the specks were solid.

Even before the A-bomb made the atom a household word, The Celebrated Man In The Street had at least a vague idea about the atom. Although there is still much to learn about its interior, we do know that the atom is a sub-microscopic solar system. Its center is a *nucleus*, which consists of positively-charged particles called *protons*, held together by *neutrons*, which have no charge.

Whizzing around this nucleus with tremendous force are negatively-charged particles called *electrons*. Somewhat like the gravitational give-and-take that holds a Sputnik in an orbit around this planet, so the electrons are held in their orbits—sometimes. The paths of electrons vary, some may occupy the same orbit, and some have minds of their own to wander off. These "free" electrons may be attracted into the system of another atom, which in turn releases an electron to another atom, and so on. The negative-to-positive movement of free electrons produces electric current. (See Fig. 1).

### *The Three "I's"*

Basically, the atom is neutral: that is, the amount of positive charges in the nucleus is equal to the amount of negative charges whizzing around outside. But the action of radioactivity, heat and light energy, electric charges, collision with other atoms, and other means may knock out or add one or more electrons. If there are more electrons than protons, naturally the atom is going to have a negative charge, and vice versa.

These negatively- or positively-charged atoms are called *ions;* the negative atoms being termed *anions*, the positive, *cations*. Some chemicals become ionized when immersed in water. Salt, for example, dissolved in water will separate into positive sodium ions, and negative chlorine ions.

This process of ionization has its practical value in electronics, particularly in various applications of the cathode-ray tube, as we shall see.

Two other "I's" which have been having quite an impressive practical workout lately are *isotopes* and *isobars*.

Naturally, different atoms of different elements have different qualities, and different amounts of protons and electrons. An atom of hydrogen has one proton and one electron. An atom of uranium has 92. So, with this in mind, we can classify elements by weight and number into a *periodic table*. (You can find a periodic table in most modern dictionaries.)

Elements, then, are classified according to their *atomic number* and *atomic*

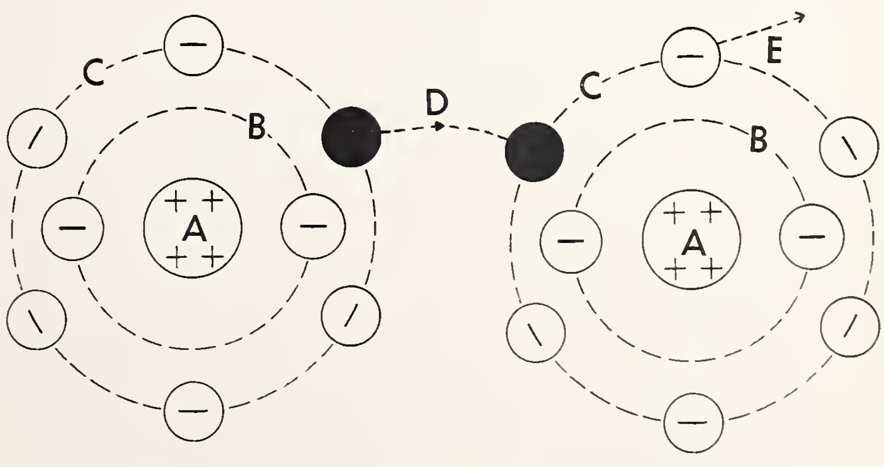


FIG. 1. Theoretical construction of electric current: (A) positively-charged nuclei; (B and C) inner and outer orbits of negatively-charged electrons; (D) "free" electron movement to orbit of other atom; (E) compensating reaction releasing a "free" electron.

*weight.* The lightest element is hydrogen with one proton, so its number is 1. Uranium, a heavy metal, has 92 protons, so its number is 92.

Atomic weight is another matter. Using an arbitrarily fixed number for one element's weight (usually 16 for oxygen—but keep in mind that oxygen's atomic number is 8), atoms are "weighted" in comparison with that number. So hydrogen's atomic weight is 1.0080, and uranium's weight is 238.07.

But it is possible for two or more forms of an element to have the same atomic number, but not the same weight. These are called isotopes. For example, U 235, the force of the A-bomb, is an isotope of uranium; and tritium (heavy hydrogen), the force of the H-bomb, is an isotope of hydrogen.

Conversely, different chemical elements with different atomic numbers may have the same weight, and these are called isobars.

Then there is the family matter called *isobaric isotope.* To put it simply(?), these are forms of radioactive atoms which have the *same* weight and *same* number, but they represent different chemical elements because in their radioactive distintegration they present different characteristics.

### *How to Build an H-Bomb*

At the moment, the energies produced by *nuclear fission* and *nuclear fusion* haven't had much peaceful practical application, but something should be said here, just on the off chance that their belligerent application won't make the study of electronics quite unnecessary—or anything else for that matter.

Some nuclei of certain elements can be split more readily than others. The nucleus of U 235 for example. Nuclear fission means just that: splitting the nuclei of atoms, which, in turn, releases tremendous energy—as we all know.

When that lone group of scientists got ready to blow the first A-bomb, they were still nervous about a *chain reaction.* In other words, once a nucleus is split and releases energy, that energy in turn splits another nucleus, and that in turn reacts upon another—with the resultant possibility that there could be no stopping it, and everything would go.

To better visualize this, imagine a number of set mousetraps packed into

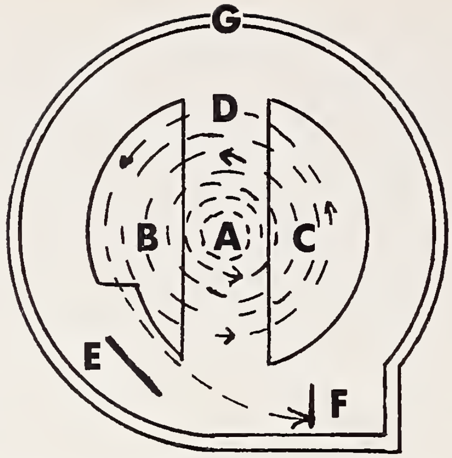


FIG. 2. Simplified diagram of a cyclotron; (A) incandescent filament; (B and C) dees; (D) path of deuteron particles; (E) deflector; (F) target; (G) enclosure wall.

a closed area. One mousetrap is triggered, flies into the air, comes down on another and sets it off, and it in turn does the same thing. But chances are that not all the mousetraps are going to be hit and set off in this uncontrolled fashion. Not yet, anyway.

The action of nuclear fusion is the opposite of nuclear fission, but it takes fission to start fusion, which is the principle of the H-bomb. Tritium, an isotope of hydrogen with a weight of 3, can fuse its nuclei into a nucleus of heavier mass, such as helium (next in weight with 4.003). This is going to leave some mass left over, which is converted into energy. But it takes a great deal of energy to accomplish this fusion, so that energy is supplied by nuclear fission. In a simplified sense, an A-bomb sets off an H-bomb, and that is why that island in the Pacific disappeared.

### *The Cyclotron*

To get back to more practical—and more pleasant—applications, man has developed controlled methods of "smashing" atoms, thus changing their structure, and consequently changing their characteristics so that they may emerge as different elements. Even new elements have been created—going beyond the aspirations of the ancient alchemists who wanted to change lead into gold.

Perhaps the most familiar form of atom smasher is the *cyclotron,* shown simplified in Fig. 2. The two semicircular metal boxes are called *dees,* and contain *deuterium,* an isotope of hydrogen. In the center is an incandescent filament. By means of a powerful outside magnetic force, a strong magnetic field is set up between the two dees, and high voltage of reversible polarity is applied.

Deuterium is composed of one proton, one neutron, and one electron. The hot filament ionizes this into a positively-charged *deuteron* consisting of one proton and one neutron, and one negatively-charged electron.

When the high voltage makes the left dee negative, the positively-charged deuteron is attracted to it, then the voltage changes polarity and makes the right dee negative and the same action occurs. The magnetic force, passing vertically between the dees, causes the deuteron to circle faster and faster until the particles have reached an enormous speed.

Once this spiralling action has reached that enormous speed, the particles, attracted by the negatively-charged deflector, are bombarded with terrific impact against some material on the target. This impact "smashes" the atoms to be bombarded. Somewhat of an electronic David's sling.

At present, one of the main uses of atom smashers is to make radioactive certain materials that are not ordinarly so—for example, the various radioactive materials used in the treatment of cancer.

This is of necessity a simplified treatment of the atom, yet its properties, actions, and perversities are all-important in the application of practical electronics to be discussed in forthcoming installments.

[TO BE CONTINUED]

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### Paramount Buys A Theatre

Paramount Pictures has returned, at least in a single instance, to theatre exhibition with the purchase of the Esquire Theatre on Chicago's North Side. The house, formerly one of eleven controlled by the Balaban Corp., seats 1400, is 15 years old, and has been showing foreign and art product. Estimated purchase price is around $1,000,000.

George Weltner, vice-president of Paramount, has stated that the Esquire will be utilized as an additional outlet for first-run Paramount pictures, as an elimination of certain marketing and booking problems. He added, however, that the move represented no policy change on the part of Paramount insofar as the divorcement of its theatre interests seven years ago was concerned. Other Paramount spokesmen declined comment, except to say that they would stand on Weltner's statement.

**Two established authorities have produced—in IP's considered opinion—what may be the best deliniation of closed-circuit TV.**

# Closed-Circuit TV System and its Practical Applications†

By MORRIS A. MAYERS and RODNEY D. CHIPP

TO UNDERSTAND the operation of closed circuit or wired TV, one must have a working knowledge of the underlying principles on which all modern TV is based. Imagine, if you will, that you have just settled down in your favorite easy chair with a new best-seller which you have been wanting to read. As you open to the first page you have a momentary impression of a sheet full of printed symbols. Your eyes then start to scan the page, beginning at the upper left-hand corner moving from left to right and, as each line is completed, dropping down from line to line and reading each succeeding line from left to right. Only by this scanning process does the printed page convey intelligence to your mind.

If you wished to communicate that intelligence to someone who could not read, you might read aloud, word by word and line by line to one or more people who might be in the same room, or at the end of a telephone line, or listening to you at their radio sets. If you wished your listeners to duplicate on paper the layout of the text which you were reading to them, you could do so by telling them where each line begins and ends.

In the circumstances described above, you and your listeners would be performing functions similar to those of TV cameras and receivers when a scene is televised at one point and viewed at another. When a TV camera is trained on a scene, light reflected from that scene is focused on the face of a special type of vacuum tube in the camera in the same proportions as it appears on the scene.

This light pattern on the fact of the camera tube does not, by itself, convey information any more than does the print on the page of your book until your eye starts to scan it. The face of the camera pickup tube is sensitive to light in one of a number of different ways, which we shall discuss later, with the result that its electrical characteristics at any given moment will vary from point to point in relation to the amount of light that is striking each point on its surface. For the time being we shall consider the operation of one popular type known as the image orthicon.

In this tube (Fig. 1), at the opposite end from the face, is an element called the electron gun which shoots a beam of electrons towards a glass disc adjacent to the face, which is known as the target. This beam of electrons is bent or deflected in such a manner as to make it scan the image of the scene as it appears on the target from left to right, and from top to bottom, in very much the same manner as your eyes are scanning this page.

Just as the light reflected from the print on this paper conveys information to your brain through your eyes as they scan the page, so in a similar manner, the beam of electrons impinging on the target in the camera tube is modified by the electrical pattern which it scans on the target, and which was created by the light pattern making up the image of the televised scene. This modification of the beam of electrons may be considered as "information" in the form of electrical pulses of varying voltage which can be conducted through electrical circuits, just as visual information is transmitted to the brain via nerve paths.

## VIDEO WAVEFORMS

To make the modification process clear, let us visualize the voltage fluc-

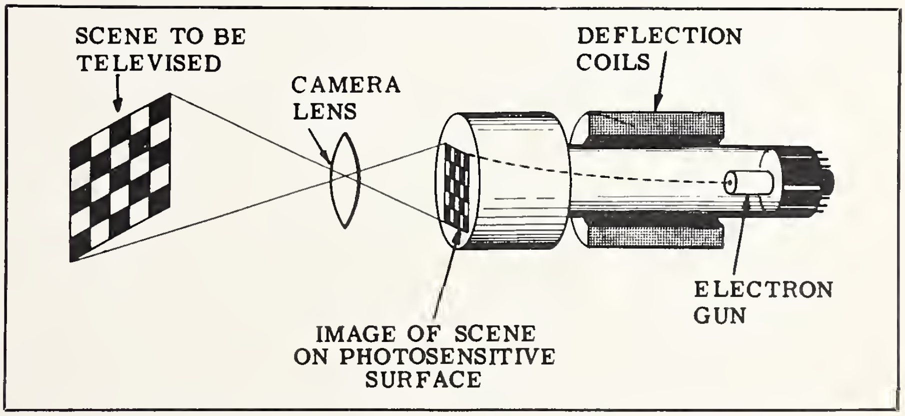


FIG. 1. Diagram of pickup tube showing beam scanning image of checkerboard.

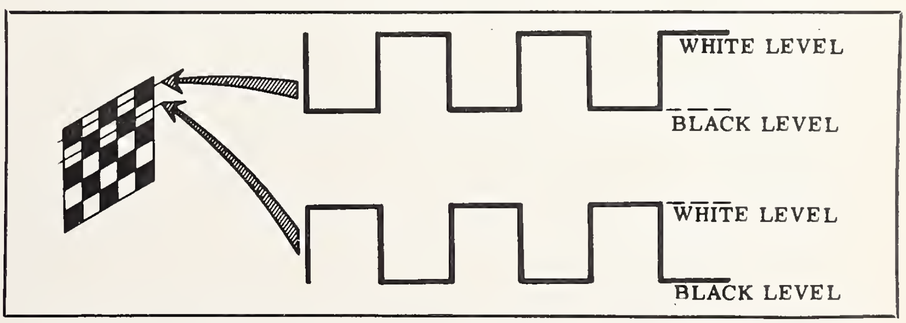


FIG. 2. Pictorial presentation of checkerboard scanning and resulting video waveform.

† "Closed Circuit TV," John F. Rider Publications, New York, 250 pp., $10.00.

tuations which take place in the electron beam when televising a checker board (Fig. 2). We shall do this by means of waveforms, a recognized method of presenting voltage and current fluctuations which is part of the language of electronics, and should therefore be understood by anyone interested in the subject.

In waveform presentations, as they may be seen on a cathode-ray oscilloscope, a line rising *vertically* from a reference point represents a voltage rising almost instantaneously to a value indicated by the height of the line above the reference point; a slanting line rising from the reference point indicates a more slowly rising voltage; a horizontal line at any given level represents a steady voltage of the indicated value, while lines declining toward the reference point indicate a decreasing voltage with the degree of slope representing the rapidity of the decrease. In the case of alternating currents, in which fluctuations occur on both sides of the reference point, the lines below the reference point represent a negative voltage with a *declining* line indicating an *increase* in the negative value.

When we televise the checkerboard referred to above, its image is focused, by the camera lens, on the face of the pickup tube. The electrical characteristics of the target are altered by this image so that the voltage of the electron beam will drop as it passes over the dark squares, and will rise when it passes over the light ones. Figure 2 represents the waveform of the voltage fluctuations which would occur as two successive lines of squares in the checkerboard are scanned.

It is obvious that a simple subject like a checkerboard can be reproduced by a small number of voltage fluctuations. If, on the other hand, the board had twice as many squares, twice as many fluctuations would be required to reproduce it in a television picture. It follows that the finer the detail we wish to reproduce, the more the voltage must fluctuate. We will see later, that a television picture involving fine detail may require as many as four million (or more) voltage pulses per second.

Pulses which contribute to the detailed construction of a television picture fluctuate at a rate which has been designated as "video frequency." Audio, of course, refers to that band of frequencies up to about 16,000 cycles per second which, if converted to mechanical vibration can be heard by the average human ear. Radio frequency, which we will usually refer to as rf, is the term applied to alternations of electromagnetic radiation which serve as the carrier waves for video information in television, and audio information in radio.

The waveform in Fig. 2 represents the voltage changes which occur in going from solid black to pure white. If the subject included intermediate shades of grey the rise in voltage from the reference point would be proportionate to the lightness or shade of grey. In the case of a colored object the rise in voltage would indicate the amount of light reflected by the color at a given point.

## SYNCHRONIZATION

Since it is necessary for the electronic information discussed above to appear at the reception point in exactly the same sequence as it was picked up at the point of origin, it is necessary to add further data which performs the same function that you would perform if you read the page aloud, telling your listener where each line started, where it ended, and when to move to the next line below. These additional elements of information are called synchronizing pulses and they fell into three categories, i. e.:

(a) The horizontal "sync" pulse which causes the scanning beam to start tracing a new horizontal line.

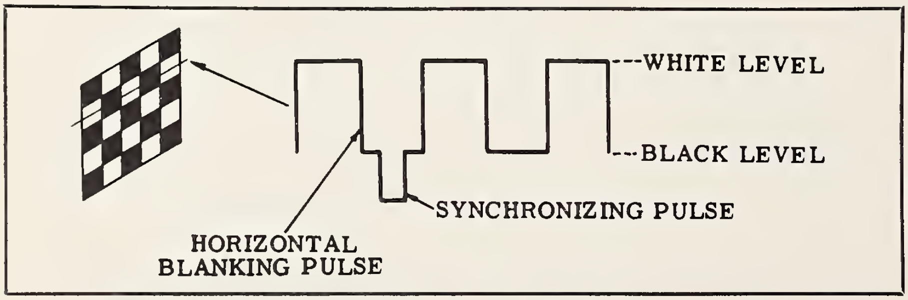


FIG. 3. Pictorial presentation of video, sync and blanking waveforms.

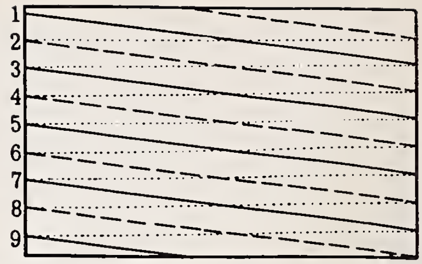


FIG. 4. Solid lines are scanning lines of first field. Dashed lines are scanning lines of second field, and dotted lines indicate retrace path.

(b) The vertical "sync" pulses which cause the scanning beam to start tracing a new field. (A field is one complete scan of the subject from top to bottom, which requires 262.5 lines.)

(c) The "blanking" pulses which cause the scanning beam to go dark and retrace its path so as to be in a position to start new lines and new fields.

Figure 3 shows, in simplified form, the sequence and general shape of the voltage waveforms of the sync, blanking and video pulses as they might be seen on the screen of an oscilloscope.

If the subject to be televised were a static one with relatively little detail, such as a page of print, it might be sufficient to scan the page once or twice a second to produce a television picture on what is known as a long persistence tube. In a picture involving motion, however, the scene must be scanned repeatedly in a rapid sequence so as to break the motion down into its component parts.

In commercial television in the United States, the picture (or "frame," which is equal to two fields) is made up of 525 lines, which are scanned in 1/30th of a second so that the eye sees 30 complete pictures per second. If the reader will recall that the illusion of motion is successfully created in commercial motion pictures by projecting only 24 complete pictures per second, he will see that television makes use of the same principle of persistence of vision which makes motion pictures possible.

## INTERLACED SCANNING

Figure 4 illustrates the path of the scanning beam. Note that the continuous line starts at the upper left-hand corner of the picture and moves in a downward slanting motion to the right. On reaching the right side, the blanking pulse takes effect and the

now invisible beam snaps back to the left side of the picture, as indicated by the dotted line. The point at which it reaches the left side of the picture is separated from the starting point of the previous line by a space equal to at least the width of a line. At this point blanking ends and the horizontal sync pulse causes a new line to start. This cycle is repeated until the bottom of the picture is reached.

It will be noted that the last line never reaches the right side of the picture but slants to the bottom of the picture midway between the two sides. This is the end of the first field. At this point vertical blanking is applied and the beam zigzags back to the top of the picture where, midway between the two sides, blanking terminates and a new line starts.

This new line, represented by dashes in the illustration, is the first line of the second field. As a result of starting at the midpoint at the top of the picture, this line ends at a higher point on the right side of the picture than did the first line of the first field, and consequently, the retrace of this line will arrive at the left side midway between the first and second line of the first field.

The line which starts from this point will be the second line of the complete picture. Throughout the scanning of the second field the scanning beam should continue to fall precisely between the lines of the first field.

## RECEPTION

The electronic information discussed, consisting of video pulses from the camera, mixed with sync and blanking pulses, is transmitted as a composite signal to the reception point, or points. Let us see what happens when our electronic information arrives at the reception point. There we find a receiver or monitor in which the most prominent feature is the so-called picture tube.

In certain respects it is similar to the pickup tube in the camera. It has an electron gun which shoots a stream of electrons towards the face of the tube which is coated with a phosphor which will give off light when struck by the electrons from the gun. This beam of electrons, too, is deflected so as to scan the face of the picture tube at exactly the same rate as the electron beam in the camera scans the target.

The receiver or monitor also contains circuits to generate horizontal, and vertical driving and blanking pulses which will "lock in" with those being received from the camera, with the result that the video pulses received from the camera are applied to the electron beam in such a manner as to strike the fluourescent coating of the picture tube at exactly the same relative points as they appeared on the target of the camera pickup tube. Electrons striking the fluorescent coating cause it to glow more or less brightly from point to point in direct proportion to the amount of light that appeared at the same relative points in the televised scene (Fig. 5), thereby creating a picture which duplicates the scene on which the camera was focused.

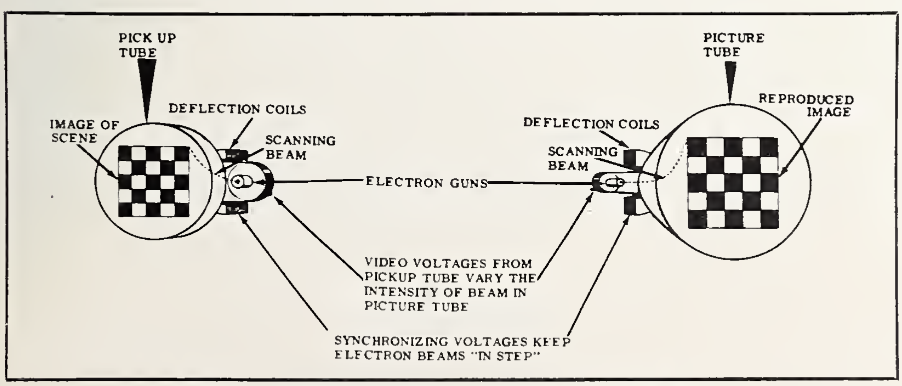


FIG. 5. Simplified presentation of picture reproduction.



## SCIENCE NOTES

Small, Hard Particles a few millionths of an inch in diameter are now being dispersed in alloys to gain new high strength materials that will hold up at very high temperatures. Acting somewhat like gravel reinforcement in an asphalt road, the particles strengthen materials that ordinarily would become pliable at extremely high temperatures. Dispersion is also considered to increase resistance to abrasive wear.

* * *

A "Submarine" Method for faster printing of motion picture films has been developed by Eastman Kodak. A portion of the film is dipped into a colorless liquid and kept there briefly during exposures, thereby eliminating need for a diffuser used to soften scratches on negatives. Color film printing can be stepped up from 90 feet a minute with a 1000-watt lamp to 200 feet a minute with a 500-watt lamp.

The function of this department is to provide a forum for the exchange of news and views relative to individual and group activities by members of the organized projectionist craft and its affiliates. Contributions relative to technical and social phases of craft activity are invited.

# *In The* SPOTLIGHT

TO OUR many friends whose gracious cooperation during the past year have made this department possible we extend our best wishes for

## A Happy and Joyous Holiday Season

• Although "Around the World in 80 Days" recently concluded a 13-week engagement at Famous Players' Gaiety Theatre in Winnipeg, Man., Canada, wages and work conditions for this feature are still in the process of negotiation. The standard contract between Winnipeg Local 299 and exhibitors in its jurisdiction stipulates that a change of policy in any theatre or the roadshowing of any picture, calls for a renegotiation of existing contracts. Failing to reach an agreement with Famous Players' on the interpretation of this clause, Local 299 requested a hearing before an arbitration board. The board agreed with the Local in its contention that "Around the World" was a roadshow picture, but declared that the matter of wages and working conditions should be settled between the disputants.

A new board of arbitration comprised of the following personnel has been set up and it is hoped that a settlement will be forthcoming shortly: Harold Stubbs, well known attorney in Winnipeg, chairman of the board; Les Butterworth, business manager of the Civic Employees Union, representing Local 299; and Harry Hurwitz, general manager of Winnipeg Odeon Theatres, representing Famous Players.

• George Schaffer, business representative for Los Angeles Local 150, recently concluded negotiations with the Egyptian Theatre in Hollywood for the roadshow presentation of the new Columbia feature "Bridge on the River Kwai." On a reserved seat policy, the contract provides for two shifts per day, each one calling for one performance, with two men on each shift. Each projectionist is guaranteed a weekly basic wage of $131.88, based on 6 days per week and 6 hours per day, plus prep time.

(There will be only 10 performances per week. Each shift will work five shows and receive pay for 6.)

For the children's shows starting at 9:30 in the morning at reduced admission prices with no reserved seats, performances will be paid for at the rate of 2½ hours at the overtime rate of $4.71 per hour. The basic scale of $3.14 per hour applies only to the standard projection machines running 35-mm film.

(The run time on the "kid" shows is 2¾ hours, but ¼ hour will be permitted to overlap into regular performance time.)

• The role of Santa Claus is not a new one to Harry Garfman, Brooklyn business representative for New York Local 306. Each year, with the cooperation of members of the Movie Social Club of Kings County (Brooklyn), Garfman organizes Christmas parties for the underprivileged and sick youngsters of various local hospitals and institutions. This year the inmates of the House of St.

MEMBERS AND GUESTS CELEBRATE 47th ANNIVERSARY FOR LOCAL 259, CHATTANOOGA, TENN.

Grouped here are members and representatives from sister Locals. Front row, left to right: R. L. Arnold, Atlanta Local 225; Geo. Hamill, L. 259; J. Price, Chattanooga L. 140; C. W. McCurdy, O. A. Ayres, L. 259; W. Lee, L. 140; R. B. Lowry, L. 259. Center row, left to right: A. S. Johnstone; Jake Pries, Atlanta L. 225; J. J. McDowell, L. 259; F. Gillespie, L. 140; F. F. Hamill, J. K. Smith, A. C. Kamin, L. 259; Frank Murdock; Jim Edwards, theatre manager; Bill Miller, L. 140; L. L. McCurdy, L. 259; Leo Nation, Birmingham L. 236; Geo. D. Overend, Jr., L. 259; Thompson, guest; L. N. Vick, W. W. Williams, Sr., O. W. Aymers, J. B. Lowry, L. 259. Back row, left to right: J. Buens, Nashville L. 626; M. E. Studt, Denver L. 230; A. W. Kamin, W. W. Williams, Jr., B. N. Vick, T. D. Ayers, P. R. Neligan, L. 259; W. R. Handley, Baltimore L. 181; J. Walker, L. 140; Walter Diehl, H. G. B. King.

Giles for Crippled Children, the Beth-El, and Jewish Hospitals, will be the recipients of the Club's activities. The distribution of toys and candies plus a program of entertainment will highlight these parties.

Garfman has been commended by his community for his interest in the care and welfare of handicapped children. His recent election to the presidency of the Brooklyn Chapter of the National Cystic Fibrosis Research Foundation is another indication of his deep compassion for the less fortunate.

• The 25-30 Club will hold its annual installation of officers on January 9, 1958, at the Empire Hotel, Broadway & 63rd Street, New York City. A dinner-dance, plus entertainment, promises to make this a gala evening. Out-of-town members are urged to send in their reservations at the earliest possible moment.

• Cecil Beesley, member of Local 440, St. John, N. B., is now working at the new Base Theatre at Camp Gagetown, Canada, as projectionist-manager. His status is that of a civilian employee of the Canadian army.

• Picketing at four drive-in theatres by members of Providence Local 223 will continue into 1958, if necessary, declared H. F. Slater, business representative for the Local, according to a trade press report. Non-union projectionists have been working in the picketed ozoners. The chief bone of contention between Local 223 and the theatres lies in the manpower situation, with the Local insisting upon a two-man projection shift, and management holding firm for one man.

• Working 40 years in the same theatre is the record stacked up by Bernard McGaffigan, projectionist at the Fenway Theatre and member of Boston Local 182.

## CELEBRANTS AT LOCAL 259 ANNIVERSARY BANQUET

A midnight banquet marked the recent 47th anniversary for Chattanooga Local 259. Celebrants pictured in the photo above are, seated: Mrs. Brownie Cuthbert, editor of local labor paper; Assistant IA President, Walter F. Diehl; J. B. Lowry, president, and A. C. Kamin, business representative, Local 259; and A. S. Johnstone, IA 6th vice-president. Standing, left to right: L. N. Vick, treasurer, Local 259; Frank Murdock, IA legal counsel; W. W. Williams, Sr., Local 259 president, and H. G. B. King, attorney for the Local.

He is a charter member and former official of the Local. Running him a close second is Howard W. Carter, Sr., member of Houston Local 279, who recently rounded out 50 years of projection work. The stamina and enthusiasm for their work belie the age of many of these old-timers.

• Charles Dentelbeck, for many years supervisor of projection for Canadian Famous Players, will retire on January 1, 1958. Born in Fort Wayne, Ind. in 1884, Dentelbeck moved to Toronto in 1909 where he helped organize Local 173. He was elected president of Toronto Local 173 in 1917 and served in that office for many years thereafter. His plans for the future are indefinite.

## OBITUARIES

Ripley, Charles L., 61, member of Local 228, Toledo, Ohio, died November 15. Born in Wauseon, Ohio, he made his home in Toledo for the past 45 years. He worked as a projectionist at the Rivoli Theatre there for about 30 years, during which time he also served several terms as business representative for the Local. He was a veteran of World War I, having served with the Motor Transport Corps. Survivors are his wife, daughter, and a brother.

• • •

Knott, Thomas, member of Toronto Local 173, died last month of the Asiatic flu. An esteemed member of the Local for the past 38 years, his death was a shock to his many friends.

• • •

Indo, Louis, 63, member of Pittsburgh Local 171, died recently at the Pittsburgh Hospital. He was one of the organizers of the Local and served in various official capacities. He is survived by his wife and two daughters.

• • •

Vaichis, George, 57, died recently following a short illness. A charter member of Local 145, Gary, Ind., he held the office of business representative and worked at the State Theatre for many years. He represented Local 145 for the past several years as delegate to IA and other labor conventions.

• • •

Storch, Nathan, 57, president for many years of Local 366, Westchester County, N.Y., died November 28 at his home in Mt. Vernon, N. Y. At the time of his death he was employed as stage electrician at the Cort Theatre in New York. He is survived by his wife, mother, brother, and a sister.

• • •

Jose, Wilbur, 63, charter member of Detroit Local 199, died last month of a heart attack. He worked as a projectionist at the United Artists Theatre since it opened back in 1928. Survivors are his wife and son.

• • •

Filderman, Irving, member of Toronto Local 173 for the past ten years, died November 21. He was also a member of the Musicians Union for 28 years.

# IP TELECASTS

## Videotape Saturation for TV?

BARELY OVER a year in operation, videotape has made such network strides that RCA has announced its intention to begin recording color TV programs on tape by April. These will be beamed from a new $15,000,000 "Tape Central" to be constructed in Burbank, Calif. The company expects delivery of six new RCA color tape recorders by that time, and these, together with the Ampex black-and-white recorders it has on hand, will constitute some eleven recorders and associated equipment that RCA considers will eliminate the need for kinescope and lenticular film processes. A similar "Central" will probably be installed in Radio City, New York.

RCA has also announced that delivery for both color and black-and-white recorders to the commercial market will be around next December. The tint videotaper is compatible, reproducing both color and black-and-white.

Meanwhile, videotape manufacturers are designing their equipment to assure complete interchangeability of recorded material among all users.

Speaking before the eighth national conference on standards last month, Ross H. Snyder, manager of special products for Ampex, said: "In setting up standards for the interchange of tapes among approximately 100 recorders, it has been necessary to design the machines in such a way that certain dimensions, velocities, currents, and other factors are common to all machines." He also asserted that by next April nearly 100 of the new recorders should be in use.

Ampex and RCA have recently negotiated a patent exchange, with Ampex swapping its black-and-white patents for RCA's color. (See IP, Telecasts, November 1957, p. 25.)

The Eastman 16-mm TV projector, Model 275, for use only with a vidicon-type camera in the projection of 16-mm film into a TV system.

### Tele-Studio's Kinescope

Another entrant into the videotape field recently has been Tele-Studios, producers of commercial kinescopes for the past 15 months. The firm has announced development of a camera system used in producing kinescopes that can also be used in making taped programs.

Claiming that the system is a major advance in the difficult technique of editing tape, George Gould, president of the kinnie firm, said that regular videotape equipment will be installed beside the kinescope machine, which was built by General Precision Laboratory. The ability to do wipes, dissolves, matting, and other effects on the spot in the control room is the key improvement to editing. These effects are usually done in the laboratory after shooting. The Telefilming process makes claim to being able to produce product in a quarter-hour at half the price of a comparable film commercial.

Tele-Studios figures that since its lighting and camera techniques are specifically designed for kinescope and not live programming, a higher fidelity can be achieved.

Installation of the videotape-kinescope-camera system is expected by next summer.

## Kodak's TV Projector

EASTMAN KODAK CO. has announced a new heavy-duty 16-mm projector for use with the Vidicon-type camera in TV projection. Designated Model 275, it uses two 60-cycle, AC synchronous motors to provide the necessary constant 24 frames-per-second film speed, and a uniform application of light to each TV field.

There are two additional 60-cycle AC motors to cool the tungsten lamp light-source and drive the take-up mechanism. The sound system terminates in a transformer with taps to match standard impedance values.

### Provision for Magnetic Soundhead

Provision has been made for future addition of a magnetic soundhead for playback of 16-mm film with a magnetic sound track. The projector is also equipped with a Kodak 4-inch $f$:1.5 projection Ektar lens, corrected for 12:1 magnification. The lens focuses the film image to the relay lens located on an optical bench.

Other features that Kodak announces for the projector include: a focusing adjustment which gives peak responses regardless of the emulsion position of the film at the sound pickup, and a stand-by projection lamp.

## GPL Closed-Circuit Camera

GENERAL PRECISION LABORATORY has developed a new single-unit closed-circuit TV camera with associated remote control accessories. Designated GPL Model PD-500, the camera weighs 12 pounds, and is completely self-contained within the camera housing. Price quoted is $1250, including the camera tube and a three-lens, manually operated turret for quick variation of lens focal length. A remote control box permits camera operation from distances up to a mile away.

To allow for remote operation of lens


New GPL closed-circuit TV camera, model PD-500. The vidicon camera, weighing 12 pounds, is completely self-contained.

iris, focus, and turret. remote control kits are available. Switches for each of these functions are in the remote control box, and intercom provision is built-in for convenience in remote operation. Remote camera pan and tilt and zoom lens adjustments may be added without modification to the basic camera.

### *PD-500 Package Equipment*

The PD-500 package includes camera, camera circuitry, and camera controls within a housing 5 inches wide, by 7½ inches high, by 12 inches long, eliminating the need for a separate control unit, or external power supply.

Controls for electronic focus, beam and target, horizontal and vertical centering, horizontal frequency, and both horizontal and vertical drives are prominently displayed on the back of the housing. Both RF and video signals are distributed directly and simultaneously from separate connectors supplying a 525 line picture to video monitors or standard TV receivers. Horizontal resolution is 400 lines or better, and only 5 foot-candles illumination is said to be required for adequate pictures.

## Eidophor Demonstration

20th-CENTURY-FOX officials and members of SMPTE saw a closed demonstration of Eidophor on a full-size CinemaScope screen in New York City recently. A specially arranged half-hour live show by Roxy Theatre talent was piped across town on an experimental wave length 12 megacycles wide. This wider band is said to obtain better definition than the narrower commercial TV band, upon which previous experiments have been tried.

This demonstration was considered to be the best since the experiments were inaugurated in 1952. Consensus of opinion was that the image obtained was not equal to a standard 35-mm color print, but a real achievement for color TV.

### Magnasync Enters Videotape

Magnasync Manufacturing Co. of North Hollywood, makers of automation and magnetic recording systems, has entered the videotape equipment market. The firm has recently acquired world rights to the patents of Dr. Lee de Forest, "father of the electronic age." Plans include early introduction of economical videotape recording equipment into the smaller independent TV stations, as well as the home market. It is the opinion of company president D. J. White that: "Within ten years video home recording will be as popular as tape recording is today."

# IP LETTERS TO THE EDITOR

## From the Coffee Country

*To the Editor of IP:*

**Although an amateur in 16-mm projection, I have been a subscriber of IP for the past three years, and look forward to Robert A. Mitchell's articles with great pleasure—especially the controversial subject of magnetic and optical sound. I must say that up to now, as far as Sao Paulo is concerned, I agree that optical seems to give as good, if not better, results than CinemaScope magnetic sound. The best here, in the opinion of myself and most of my friends, is that Perspecta sound, as used in the Metro cinemas, is by far the superior.**

**As I have missed reading in IP any article on Perspecta sound, I would like to know in what previous issue or issues the subject was dealt with. Also, is there any way of adapting this system for a 16-mm projector? I often give shows at clubs, etc.**

**The films I use are 16-mm standard optical sound prints, and I use a DeVry projector with a 750 or 1000 watt lamp. Screen size is about 7 by 5 feet, 3 inches; throw about 40 feet; size of hall being about 18 by 45 feet.**

**In your opinion, would a curved gate give any improvement to 16-mm projection?**

**In Mr. Mitchell's article for the December 1956 issue of IP, he mentions for single optical tracks a 'pseudo' stereophonic system: one center high- and low-frequency speaker, and two side high-frequency speakers. Do you think this applicable to 16-mm work? Or is the screen size too small?**

**Sao Paulo, Brazil — Hugh S. Cam**

## Robert Mitchell's Reply:

Although magnetic soundtracks are capable of giving excellent results, the design of the reproducing equipment, the conditions under which the prints are handled, and lack of adequate care of magnetic reproducers in theatres generally makes magnetic reproduction noticeably inferior to optical, which is not at all exacting as regards print handling and equipment upkeep. These are the principle reasons why I repeatedly call attention to the superiority of standard optical sound for theatre use.

I, too, have been favorably impressed by the Perspecta method of reproducing stereophonic effects from single-channel optical tracks which have been "cued" by three subsonic tones. As you probably know, lack of interest on the part of exhibitors has forced the discontinuance of this interesting system. There were only 150 Perspecta installations in the whole of the United States. Because the system was a failure commercially, Perspecta Sound Integrators are no longer manufactured.

An interesting and informative article on Perspecta Sound, written by Robert Fine, its inventor, was published in the special Convention Edition of IP for July 1954, p. 32 *et seq.* An article on Perspecta Sound appeared in the September 1954 issue of IP, p. 26 *et seq.*

While curved gates are used with good results in at least two makes of 35-mm theatre projectors to minimize film buckling (the Gaumont-Kalee and the Simplex X-L), it appears doubtful that any noticeable benefits could be expected of curved gates in 16-mm projectors. The amount of buckling and "film flutter" prevailing in 16-mm projection is very slight compared with that in 35-mm projection.

### *Use of Multiple Speakers*

The use of multiple speakers for 16-mm work should give excellent results, particularly in large salons, or in situations where the audience area is wide in comparison to its length. The purpose of the multiple speakers is, of course, to provide a more natural sound "presence" and avoid the usual center-of-the-screen effect. Properly placed, the three speaker systems will bring the sound closer to each spectator and overcome the effect of distance between the spectator and the sound source. In fact, by crossing the projected-sound beams from the two side speakers, it is possible to create a false sound source which is only a few feet in front of the spectator.

One may use three combination low- and high-frequency units at center and left and right sides of the screen, of course. It has been found, however, that the low frequencies of sound are practically non-directional; hence, to save trouble and expense, it is only necessary to have one low frequency unit. This should be balanced in relation to the high-frequency units, i.e., placed at or near the middle of the stage. The center high-frequency unit should be positioned near the low-frequency unit, while the side high-frequency units should be a little beyond the sides of the screen if the screen has the conventional 4:3 format. If care is taken to phase these speakers correctly, the results are quite gratifying, and completely eliminate the effect of uni-directional point source of sound.

What Is YOUR Problem?

# Projection CLINIC

## Strong Film Splices

A STANDARD film splice should be as strong as the film itself. If the sprocket holes are properly registered, and the join is otherwise well made, the splice should last for the life of the print. Skeptics should consider laboratory-made midreel splices in 2,000-ft. rolls of film. These seldom trouble the projectionist by coming apart.

Projectionists sometimes complain that their splices, particularly in reels of trailers, have a tendency to pull apart after many runs. Even so, projectionist-made splices behave mighty well in comparison with exchange-made splices. (The exchange ladies don't have to run their own patches.)

If the emulsion and underlying transparent gelatine binder are completely scraped from the overlap stub, and the butt stub (cut along the middle of the frameline) is thoroughly cleaned to remove traces of oil from the celluloid side of the film, the use of a good grade of film cement with uniform pressure while "setting" will insure a solid join.

Present-day prints are made on triacetate safety-film base, a material which cannot be satisfactorily joined with the old nitrate splicing fluids such as acetone, amyl acetate, and a half-and-half mixture of alcohol and ether. Triacetate cements must contain liberal proportions of dioxane, although glacial acetic acid containing small amounts of acetone and chloroform will work in an emergency.

The projectionist owes it to himself, therefore, to try out the different available brands of safety and all-purpose film cements to find the one which works best for him. Among the favorite brands are Ethyloid, Rosco, Eastman Kodak, and Bulldog. Each of these cements requires from 10 to 15 seconds setting time in the splicing block. (A longer time in the block may weaken the splice along the edges of the join.)

To recap, make sure that the transparent binder layer is completely scraped off and that the celluloid side of the butt stub is clean and, preferably, slightly roughened. Apply film cement *liberally* in not more than two brush strokes. Then join the two ends of the film quickly.

Exchange inspectresses seldom apply enough film cement to the scraped stub. For this reason we recommend for exchange use a film cement as thick as honey. A high cement viscosity would help insure the application of a sufficient quantity. Most projectionists, on the other hand, have a magic touch in film splicing, and do not need to be tricked into adequate cement application. Projectionists should use cements which are not too thick.

### Economical Projectionist

Economy in projection practice is, of course, a highly commended virtue—but like most virtues, it can be carried too far. Moderation in all things. Consider this query recently published in the German publication, *Bild und Ton:*

Question from a correspondent: The teeth on the sprocket of my Maltese cross were worn out completely, so I turned it the other way round. Now that side is worn out, too. What shall I do?

Answer: Throw it away.

## Water-Cooled Carbon Jaws

WATER-COOLED JAWS for the positive carbon in lamps of modern design are usually made of solid silver or of gold—or of platinum-plated brass. The use of a "noble" metal to contact the positive carbon prevents an electrolytic reaction which corrodes copper-alloy positive contacts.

To insure long life of the expensive silver jaws do not operate these lamps without water cooling when the arc current exceeds 85 amperes. No great damage will normally result, however, if water circulation fails during projection. Only the plating on chromium-plated jaws may be damaged by the heat: gold or platinum platings, on the other hand, will not "burn" or peel off like chromium.

Inspect the positive contact-head assembly daily, making sure that sufficient contacting pressure is maintained for conduction of the arc current. Insufficient pressure will generate heat in the contacting surfaces and burn them.

The "noble" metals do not form oxides by direct combination with the oxygen of the air, as do copper, iron, and many other active metals. Silver, however, combines directly with sulfur, extracting it from the sulfurous fumes usually present in trace quantities. The brownish coating sometimes found on silver carbon contacts is silver sulfide. This may be removed with silver polish (e.g. "Cando" paste or "Noxon" liquid).

Badly pitted or excessively dirty contact surfaces in the positive jaws of all rotating-positive arc lamps may be smoothed with No. 00 sandpaper or with crocus cloth wrapped around a negative carbon. Brush out all grit and dust after the smoothing operation.

## 35 Millimeter Favored

THE LIMITATIONS of wider-than-standard motion-picture prints are painfully apparent to all who have critically observed such 70-mm projections as the old Fox Grandeur production of "Happy Days" or the current Todd-AO epics ("Oklahoma!" and "Around the World in Eighty Days"). Buckle is so pronounced that either the middle or the sides of the picture may be brought into sharp focus, but not both at the same time.

The use of wide-film negative without stopping down the camera lens, moreover, reduces depth of field to such a degree that the background even in medium-length shots is a confusing jumble of blurred detail. This defect of wide film was especially annoying to this observer in Todd's "Around the World". The 35-mm CinemaScope version, which the writer has not yet seen, may possibly be better photographed.

These considerations, though quite naturally unmentioned by Showman Todd, may have played an important part in his recent decision to concentrate upon the 35-mm CinemaScope version for future exhibitions. (See IP for September 1957, p. 24.)

### Laundromats Yet!

Australia, which is pretty hep on drive-ins, has a new one in Pretoria that offers laundry service. Arriving patrons leave their unwasheds at the entrance, and after the show is over, pick them up Rinso-white. The only thing that bothers us is: supposing there is an overload of untidy garments? Does that mean you have to stay through a double-double feature? Considering the length of some features these days we might as well ask for ironing to boot. Will this replace pizza?

# 16-mm PROJECTIONS

THIS DEPARTMENT is mainly devoted to what is known as the audio-visual field. IP considers this section of the motion-picture industry of extreme importance, as do leaders in education, industry, medicine, the armed forces, etc., who have spent billions (we mean billions) of dollars on this medium. The influence it has had and will have is immeasurable, and the technical advances in what used to be considered an amateur hobby have been outstanding. To be sure, 16- and 8-mm is still an amateur hobby, but it has also penetrated the professional entertainment field in both TV and motion-picture theatres—including drive-ins. But its main function remains in the world of instruction.

Progress, of late, seems to be increasing speed. And, as the world changes, so must its chronicles—including this magazine. Considering the amount of inquiry IP has received concerning 16- and 8-mm, we feel that the medium deserves notice here. This magazine is by nature technical, but, as in other departments of IP, this will not prevent the inclusion of noteworthy news of a general nature.

## First Annual Industrial A-V Exhibition Held

NEW YORK CITY was host last month to sales executives, training directors, advertising managers, production managers, film producers, audio-visual directors, and other lesser and higher lights in the A-V world at the First Annual Industrial Audio-Visual Exhibition held in the Trade Show Building. Besides some 35 firms exhibiting their latest equipment, there were a number of guest speakers, and an historical exhibit of pioneer motion-picture and photographic equipment. To highlight the exhibition New York's Mayor Robert F. Wagner proclaimed the week of November 10-16 as "Audio-Visual Week." "A-V, from a small beginning in the educational field," he said, "has, as young as it is, made tremendous strides in the last years. It has revolutionized sales promotion, public relations and training, even TV has become part of this industry."

Significant to note that New York City is making a strong bid to become the A-V center. It is a fact, as Wagner pointed out, that 80 per cent of the national sales offices of the largest corporations and organizations are located in the metropolis. It is also a fact that the city has pretty well lost the commercial TV initiative to Hollywood, where there are the better facilities. For TV, that is. But A-V is a different, and in this department's opinion, a more organized medium. And it should not be forgotten that the advertising world is primarily centered in a few fabulous blocks of Manhattan.

### *"Sound and Vision as a Tool"*

Theme of the industrial A-V exhibit was "Sound and Vision as a Tool." Enlarging on this, Herbert Rosen, president of Industrial Exhibitions, Inc., has stated that: "The tremendous progress A-V has made in the industrial field in the last few years has been the result of three major influences: first, the development of new devices; second, the improvement of equipment; and third, the influence of better and more effective presentations. . . . Production figures in the industrial A-V field, not only in the manufacturing of equipment, but also in its correlated services, now run not only into millions of dollars, but into hundreds of millions. Yet this is only the beginning. Besides, the bigger corporations, most of the smaller manufacturers or dealers have not even begun to recognize the great value of A-V, and are not aware of how they can use it to their best advantage."

To some extent, the activity and diversity of the recent exhibition would tend to refute that last observation.

### *New Equipment Lineup*

By and large, projectors and accompanying equipment were in the majority at the exhibition. However, a diversity of manufacturers were represented: closed-circuit TV, spotlights, A-V window blinds, sales presentation methods, industry periodicals, titles and captions, film reconditioning methods, transparency printers, easels and binders, consultant and engineering services, and battery-operated record players, to name a few.

Space here does not permit a complete cataloguing by product of the many exhibits, but at objective random:

Calnatron, developed by NBC and RCA research, features an A-V system employing the use of two or more TV cameras in production, which record what is later to be printed on 16-mm film. The advantages claimed are time factor, live editing which eliminates the need for later cutting, and mobility. And, of course, economy was stressed.

Polacoat, Inc., of Ohio, makers of Lenscreen—a treated plastic or glass lens-like rear projection screen—have announced intentions of entering the drive-in field. Advantages of using Lenscreen, the makers claim, is twofold: first, rear-projection economy, and secondly, the screen's main selling point is that it is able to accurately reproduce image contrast in almost any level of illumination, including deep color tones. Also claimed is 70 lumens per square feet in any weather.

General Electric had a closed-circuit demonstration on hand, utilizing the small, compact Intra-Tel camera and a control unit that measures only 8½ x 15$\frac{1}{16}$ x 20 inches, and weighs only 66 pounds.

The TSI new MovieMatic, a 16-mm repeater sound projector with a built-in, self-contained projector-sound-screen system, demonstrated very good definition of an exhibition color film. The MovieMatic may be used on a desk, counter, etc.

Genarco exhibited their new Model sm.2, a 3000-watt slide changer with a 70-slide changer, described in IP for May 1957, p. 24.

Polaroid Corporation unveiled its new film—Polaroid Land Projection Film—which enables the user to snap any picture and project it on a screen a few minutes later. Claims for the film include a speed of 1000 (ASA equivalent), the fastest available film on the market, and a virtually grainless image which permits sharp projection up to

(*Continued on page* 36)

**Convention Report:**

# Pay TV Takes a Beating from TOA-TESMA

THE KEYNOTE address by Elmer Rhoden, president of National Theatres, at the combined TOA-TESMA-NAC convention in Miami Beach last month outlined four points for militant action, and those four points dominated discussion wherever exhibitors and manufacturers met.

Addressing the delegates gathered in the Americana Hotel, Rhoden cited the impact of TV as the Number One problem, and maintained that only by demanding proper clearance of product could the industry co-exist with free TV. What was wanted was anywhere from two to seven years' exclusive run over free TV with the right to advertise that such pictures would not be shown on TV for that period, combatting the I'll-wait-and-see-it-on-TV attitude of present-day potential customers.

A steady supply of quality pictures properly spaced was listed as the second problem. "We starve in the fall and spring," Rhoden said. "We are forced to hold pictures for longer runs than they are entitled to, and in the two seasons when they are grouped, we have more pictures than we can properly handle."

The third problem was modernization of theatres. Noting that 90 per cent of the indoor theatres are old, and that 4,000 or 5,000 obsolete theatres will be shuttered, Rhoden called for preparation for a new era. He predicted that theatres will be fewer, but better, more comfortable, more convenient and more modern in concept. He also advised the exhibitors to get ready for wall-to-wall projection, pointing out that more pictures will be made in the widescreen medium, and more roadshow attractions seem to be the pattern for the future.

The final basic point to achieve, Rhoden asserted, was unity and organization. Urging his audience to put aside petty bickering because too much was at stake, the keynoter emphasized that unity must be attained among exhibitors at both the local and national level, "and once that is accomplished, exhibition can prove to the industry that it is capable of organization."

### *Stellings and Johnston Concur*

Backing up Rhoden, Eric Johnston, president of MPAA, asked for an end of controversy between exhibitors and distributors, maintaining that "the noisiest issues within our industry are mostly fancied and cooked-up. What's more, they are beside the point. They distract and divide us. They lower our sense of judgment as fast as they raise our blood pressure."

Johnston belittled anti-exhibitor charges that present-day exhibitors have ceased being showmen as "a mess of buckshot" and "grossly exaggerated." He also decried the blanket charge that most theatres are falling apart. Defending the distributor, he dismissed "this astonishing theory that the distributor is hell-bent to destroy the boxoffice," as nonsensical as the blanket charges made against exhibitors.

Equally ridiculous, he felt, was the idea that Hollywood was holding down production to create a shortage and a seller's market, maintaining that the figures simply did not back this up. Citing the bookings of four unidentified companies in the past twenty years, he said the figures demonstrated that thousands of theatres had not played pictures available to them.

Johnston promised to press "with all the persuasiveness I can" on producing and distributing companies for release dates fixed on a 52-week year, but felt that the wise and proper approach to the problem of spacing product was separate meetings between exhibitor and distributor heads.

Ernest G. Stellings, re-elected president of TOA, emphasized that three prime problems faced the industry: the quantity, the quality, and the time schedule on which product is released.

In line with this, four distributors have pledged an orderly release of

their product: 20th Century-Fox, Universal, United Artists, and Columbia. These companies are also willing to "work out whatever they legally can to provide all possible waiting time between the end of theatrical showings and the release of such pictures to TV." TOA expects other producers to fall in line with the four companies.

### *TOA Nixes Tollvision*

In spite of the presence of top representatives from both cable theatre and International Telemeter systems, TOA went on record unanimously as against any and all forms of pay TV. The decision was made after an all-day session: "Is Pay TV Good for Exhibition?" Definitely, the exhibitors thought not. The official resolution is being sent to both houses of Congress, the trade press of the motion-picture and broadcasting industries, all regional units of TOA, other exhibitor organizations, and the presidents and sales managers of production companies in this country and Great Britain, and to anyone else TOA feels should know.

The resolution, which charges that pay TV would reduce the theatre audience to the point of doing away with exhibition, and also reduce the quality of product, came as somewhat of a surprise to the fee-V proponents.

Another surprise was the introduction of yet another outfit preparing to enter the fee-V picture: Selectivision, a cable TV company that claims it is prepared to wire 15,000 homes in the Forest Hills, Queens, N.Y. section. Two other surprise elements were that this is in the New York City area that president of the City Council Abe Stark has declared strictly off limits, and that Selectivism will foot all costs of installing between the homes and the theatre, as well as maintaining the special theatre projection equipment.

Both Louis A. Novins, president of International Telemeter Corp., and Milton Shapp, president of Jerrold Electronics Corp. which has installed the Bartlesville, Oklahoma, cable theatre, maintained that a great deal of interest in pay-TV was expressed by the visiting manufacturers and exhibitors, and the paying public would have the final decision as to the success of pay TV. It is interesting to note, along these lines, that a *TV Guide* poll of some 45,000 of its readers turned up a 96.6 per cent turndown on any form of pay TV.

TESMA visitors were mainly concerned with selling their products and getting a look at their competitors' wares. But there was the overall feeling that the manufacturers were arriving at a more stable view of things; no one was going off half-cocked over every new product or process that came along, there was a lessening tendency to go overboard on fantastic claims, or accepting them. With some of the manufacturers, at least, there was a growing understanding of the needs of the smaller exhibitor, the regular bread-and-butter man who makes the profit for this industry, which is a healthy sign.

The election returns:

Thomas E. La Vezzi, La Vezzi Machine Works, president; Larry Davee, Century Projector Corp., vice president; Lee Jones, Neumade Corp., chairman of the board; Merlin Lewis remained as TESMA executive secretary. Directors are: Ben Adler, Adler Silhouette Letter Co.; Clarence Ashcraft, C. S. Ashcraft Corp.; Fred Aufhauser, Projection Optics Co.; William Cedris, Ideal Seating Co.; J. Robert Hoff, Ballantyne Co.; Arthur Hatch, Strong Electric Corp.; Arthur Meyer, Simplex Equipment Corp.; Fred Matthews, Motiograph Corp.; V. J. Nolan, National Carbon Corp.;

*(Continued on page 37)*

## International Exhibition to Choose Best(?) Films

The Universal and International Exhibition to be held in Brussels, Belgium next year will plan to present a World Film Festival, a complete as possible panorama of film art. The principle feature of this will be a judging of the twelve best films of all time—limited, of course, to those existing films that are still in projectionable condition. Films will be selected from all product issued between 1895 and 1955. Eligible are all films, long or short, allowing for all projection systems known at present, and all sound reproducing systems in use at present.

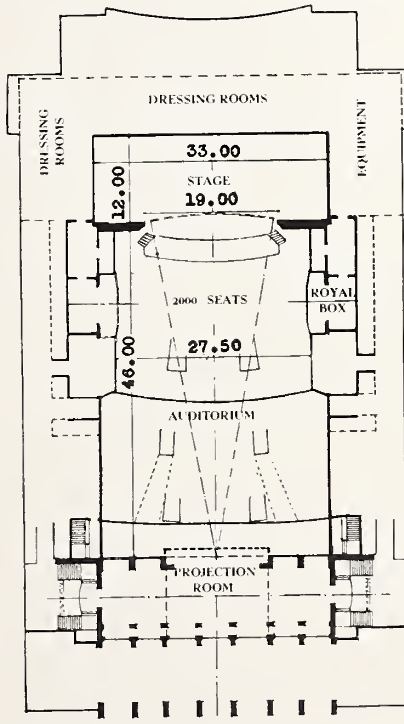


Diagram of the main auditorium of the 1958 Universal and International Exhibition to be held in Brussels, Belgium next year. It is equipped to present all known projection and sound systems to an audience of 2000.

This monumental task will be assumed by two juries. The first will be made up of fifty specially-chosen film historians throughout the world. Each member will choose the thirty films he considers most important, and from these fifty lists a single list will be compiled in which the films will be arranged in order according to the number of votes given each.

From this list the twelve available and most often cited films will be chosen. These twelve films will then be submitted to a second jury consisting of seven individuals of international repute in the arts (novelists, dramatists, painters, musicians, etc.) whose task will be to classify them in order. A gold medal will be awarded the top film, and silver medals will be offered the remaining eleven. Silver medals will also be awarded to those films of merit that are out of the competition, i.e., prints unavailable from any source.

The twelve films will be shown in October 1958 in the main auditorium of the Exhibition in October. This theatre, equipped for all the various projection systems, and sound reproducing systems, will house 2000 people.

The Belgian Film Library, member of the International Federation of Film Archives, is responsible for the organization of the presentation. They recognize that the decision will of necessity be an arbitrary one, but they feel that the chosen films will be, if not of the absolute best, at least among the best. The stated aim of the competition is "to draw world attention to the great film productions of the past, and to combat the prejudice which causes the cinema to be regarded as a fugitive and perishable art, justified only by its present achievements."

# Selection of Replacement Equipment In Army and Air Force Theatres†

By W. D. SHEPARD

## PART II

IN THE MATTER of lenses the problem of early delivery no longer exists. In a general way, projection lenses fell into 4- and 6-element categories. On the theory that the larger and better houses could afford the best lenses, and that in this manner limited funds could provide the greatest number of patrons with the best possible pictures, purchases were made from among a variety of makes and types.

In the few instances where very long focal-length lenses were required with the larger screens and where light consequently was a problem, 4-inch diameter lenses were used. The alternative purchase of larger lamps, with their higher maintenance and operating cost, would have represented not only a greater original investment but a continuing expense. Anamorphic lenses, too, were purchased in different types and from several sources. As in the case of most other products, each design had its advantages and disadvantages, but all gave very satisfactory results. Both prismatic and cylindrical types are in use.

### *Obsolete Installations*

The CinemaScope process required a reorientation of thinking with regard to sound as well as picture. Because five changes of programs are needed each week, the product of all companies is required. Because some product was available only in magnetic form, it would not have been possible to disregard stereophonic sound even had it been desired to do so. Since this would constitute an expensive conversion concerning which controversy existed in the industry, it was decided to proceed slowly and with considerable caution.

The greater part of the existing sound equipment, although not new, was of excellent quality, but there were a fair number of installations that were becoming obsolete. It was therefore decided to procure a reasonable quantity of stereophonic equipment and install it in the more important theatres. The equipment thus released could be reconditioned and used to replace older or less desirable types. By this means, too, an appreciable reduction in spare sparts stocked for emergency or routine repair purposes would be possible.

Well in advance of making any decision as to purchase, all available products were investigated. At this time, 3- or 4-channel magnetic equipment was simply being added to the optical sound systems already installed, which were sometimes utilized for the fourth channel. This appeared to be a rather poor engineering approach.

If newer and better equipment was to be installed, it seemed that it would be preferable to use it with optical as well as magnetic sound, and to remove the older equipment entirely. By so doing, the number of controls could be reduced and operation generally simplified. This was an important factor, for in the Armed Forces men are frequently transferred and retention of the more experienced projectionists is not always possible. Manufacturers were approached with this in mind. Several were considering such designs, and they were available by the time the equipment was required.

In making the choice of equipment, consideration had to be given to a number of other factors, some of which might have been of somewhat less importance in theatres where fairly permanent and fully experienced projectionists would always be available. Simplicity of controls, easy replacement of individual units, ease of assembly and wiring, presence of complete standby channels with simple emergency switching, availability for prompt delivery and, of course, a satisfactorily low price combined with the best possible quality were desired.

Needless to say, no one product could be expected to be superior in all of these respects. The choice, therefore, represented the best compromise possible at the time from this particular point of view and for the contemplated condition of operation.

### *25 Per Cent Magnetic*

Altogether, about 25 per cent of the Army and Air Force theatres in this country have been converted to magnetic stereophonic sound, which is comparable to the percentage in civilian theatres. Inasmuch as magnetic prints are not as readily available as might be desired, no conversions are being made at present, although all new theatre designs are being so made that such equipment can be installed at any time.

The projector program has been entirely different. The new processes have necessitated no changes other than relatively simple field modifications. The existing policy of gradual replacement of older machines remained unchanged. Projectors take a very long time to wear out and by proper maintenance can be continued in service almost indefinitely.

However, new models appear from time to time and frequently have distinctly superior features. It would, therefore, appear to be uneconomical

† SMPTE Journal, May 1957

### Bolex Movie Contest

A contest for home movie cameramen who own Bolex movie cameras has been announced by Paillard Inc., the American branch of the manufacturers of the Bolex movie cameras.

The contest will include categories for 8- and 16-mm movies, as well as special categories for 8- and 16-mm titling, and the use of sound in home movies with the Bolex Synchromat.

Deadline for entries in the current contest, which will be an annual event, is August 30, 1958.

Prizes will amount to $800.00 in Bolex merchandise. Also, winners will be recognized with the award of Bolex medals for "achievement in motion picture photography." Complete rules for the contest may be obtained from Paillard, Inc., 100 Sixth Ave., NY 13, NY.

Winners will be announced in December, 1958.

to replace projectors after too short a period of service, and technologically unwise not to replace them as definite improvements reach the market.

At the same time, utilization of too many types at any one time has disadvantages, for repair and emergency parts stocks must be maintained for each model, or as an alternative, purchases would have to be made where and as needed. The established policy, therefore, is to maintain a gradual replacement program, with the older machines being retired at a rate partially determined by the desirability of currently available models. Customarily, the latest model is utilized in the larger and better theatres, and older types are transferred to the less important situations as convenience permits.

Directly connected with the new processes is the modernization of stage equipment. The new screens often had to be in new locations because of dimensional changes. Screen curtains required replacement, and other draperies frequently could not be continued in use or could no longer serve their purposes effectively. The replacement of curtains and stage settings has been gradual and is still under way. All materials must be flameproof, and to eliminate the cost of periodic flameproofing, durable processing is used. At the present time, this is difficult to apply to velours, but several flat fabrics present an excellent appearance.

### *Screen for Stage Shows*

It is important that at least one theatre on each large military installation be suitable for the presentation of stage shows. Very few have fly lofts sufficiently high to accommodate the screen. Screens had to be retracted by hanging them on arms pivoted at the back wall so that they could be lifted and drawn back in one operation. It was found that reasonably strong metal frames could be retracted in this manner without great difficulty. In other cases, the frames were mounted on rollers.

It was decided to mask to the largest

(*Continued on page* 35)

# New Products for the Industry

A High-speed $f$:1.4 lens capable of projecting all film widths up to 70-mm was introduced at the recent TOA-TESMA convention by Projection Optics Co. of Rochester, N. Y. The lens can handle the wide film in focal lengths from 2.75-inch E. F. up.

According to Fred Aufhauser, president of Projection Optics, the lens was "designed to give the maximum light with special emphasis on the elimination of the so-called hot-spot."

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Genarco, Inc., has announced a new slide changer for 3¼ x 4-inch slides, the only slide changer for those dimensions in this country. The changer will take as many as 70 slides in a compact magazine, slides being changed by push-button remote control in less than a half-second. The Genarco Model 6800 can be mounted on most existing 3¼ x 4-inch slide projectors. The company asks that prospective customers indicate the model of their slide projector on which the changer will be mounted. For information: Genarco. Inc., 97-00B Sutphin Blvd., Jamaica 35, N. Y.

New Genarco 70-slide changer Model 6800.

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Nine new unitary loudspeakers have been added to the line of coaxial and TRIAXIAL high-fidelity loudspeakers produced by Jensen Manufacturing Co. of Chicago. The new speakers include a three-way 15 inch TRIAX loudspeaker Model G-600. This TRIAX, with the firm's G-610 TRIAXIAL (introduced originally in 1950), is said to provide the only two unitary three-way speaker systems having three independent electrical and acoustical channels. Four new Type CX coaxial three-element speakers in both 12- and 15-inch sizes have also been added to the Jensen line. In these units, a dual diaphragm provides a claimed outstanding low-fidelity and mid-range performance, while a compression driver "supertweeter" covers the higher frequency range.

Also included are the two new DUAX two-element loudspeakers in 12- and 15-inch sizes which use dual diaphragms and two new UNAX deluxe extended range speakers in 8- and 12-inch sizes.

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The sharps color chart and gray scale is now being distributed by Camera Equipment Co., Inc. of New York City. The color chart will aid TV and photographic technicians in determining in advance just how colors will reproduce in monochrome. The chart is simple to use and will cover all the known requirements of day to day operation. The precision reference chart is applicable to TV, cinematography. photography, and the graphic arts.

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A new 9-mm positive projector carbon is now being released by National Carbon Co. Designated the Suprex 9-mm by 14-inch positive carbon, it is recommended for operation in a 65- to 85-ampere current range.

The company claims that the new 9-mm carbon is designed to produce up to 10 per cent more light, and burn up to 30 per cent slower than previous type carbons in its current range.

The new carbon is the most recent addition to the 7-mm, 8-mm copper-coated carbons previously developed, and the new 10-mm, 11-mm, and 13.6-mm high-intensity positive carbons recently developed to meet the light requirements of widescreen processes and drive-in theatres.

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Picto-scope, a special lens system that will work on 35-mm cameras and projectors for widescreen pictures compatible with CinemaScope, has been developed by Apex Specialties Co., which also provides anamorphic lenses for 8- and 16-mm cameras and projectors. The system squeezes 2.66 to 1 ratio onto the regular camera film, and unsqueezes it for projection. With full standard frame, Picto-Scope is compatible to CinemaScope aspect ratio 2.66 to 1; with optical sound on 35-mm, to aspect ratio 2.35 to 1; with magnetic sound on 35-mm, to aspect ratio 2.55 to 1. The anamorphic Picto-Scope lenses are in micrometer focusing mounts, and are said to be equally suited for color or black-and-white film.

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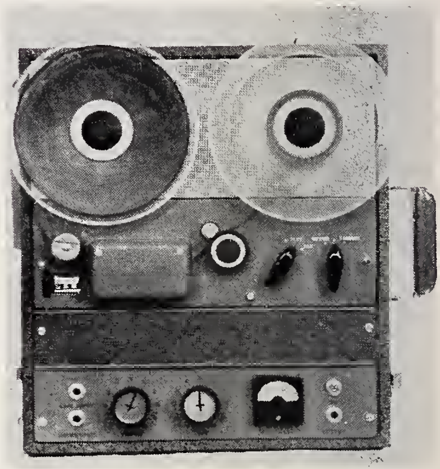
The roberts recorder model 90, which Roberts Electronics, Inc. of Los Angeles has recently developed, is claimed to be the first medium-priced magnetic tape recorder with a hysteresis synchronous drive motor. This drive motor and a precision-balanced flywheel are said to hold wow and flutter to 0.18 per cent at 7½ inches per second. Designed with greater power than it is required to put out, the motor is maintained to remain cool over hours of continuous recording.

The portable unit is styled in a hardwood carrying case covered with sheer gray pyroxalin, and weighs 28 pounds.



Roberts tape recorder.

The complete package including mechanism, amplifier, preamplifier, speaker, and microphone, has high and low level input and output, either through the 7-inch extended range self-contained loudspeaker, or an external output to other equipment.

The new amplifier features professional terminal board wiring, and has an illuminated VU meter for precise control of recording levels. Frequency response is quoted at 40 to 15,000 cps at 7½ inches per second, and 50 to 7000 cps at the 3¾-inch speed. Signal to noise ratio is 50 db. A resetable index mounted on the front panel allows instant location selections on the tape.

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Negastat 107r is a new anti-static lubricant for phonograph records and transcriptions. Besides cleaning and rendering records free from static, the lubricant is claimed to add life to the needle and record. It can be safely used on all types of records and is non-flammable and non-toxic. For details: Jack's Creations, P.O. Box 426. Chicago 90. Illinois.

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### Film Festival Opens

The International Film Festival opened in San Francisco on December 4 with entries from a dozen countries. The San Francisco Art Commission has appointed Irving M. Levin, of San Francisco Theatres as coordinator.

## PERSONAL NOTES

ROBERT W. REDECKER has been appointed manager of RCA's sales and merchandising, Consumer Products Service, RCA Service Co. He will be responsible for all sales and advertising for that organization. Redecker joined RCA Service Co. in 1951, and has served as district manager for the St. Louis department.

* * *

ALAN COOK is a new sales service supervisor, Professional Motion Picture Products, Ansco, Binghamton, N.Y. 15 years with Ansco, Cook has held positions in Quality Control and Technical Sales. In his new position he will supervise the sales and service of professional motion picture products in the Los Angeles and San Francisco sales districts.

* * *

W. D. HAUSLER, former vice president and general manager of Century Projector Corp., has been elected president of that organization to succeed the late H. E. Hammons. Hausler, prior to his post as vice president, served as the company comptroller from 1941 to 1945.

* * *

EUGENE F. RICHNER has been named manager of technical and scientific information in the public relations department of Eastman Kodak Co. Previously manager of the Kodak Park Works section of the public relations department, Richner has been associated with Kodak since 1942. His former position will be taken over by CHARLES E. LYONS, who has been with the public relations department since 1954.

* * *

WILLIAM G. FOCKLER has been named manager of technical products engineering at DuMont Laboratories, Inc. Prior to the new appointment, Fockler was assistant engineering manager of the technical products division. With Du Mont twelve years, he has been part of the engineering team for instruments and technical products.

* * *

MILT SHERMAN has been appointed merchandising manager of Radiant Manufacturing Corp. of Chicago. In his new position, Sherman will handle all special campaigns and promotions, conventions, store displays, special presentations, contests and sales aids. The new department was created to directly assist dealers at the point of sale. Sherman is a veteran of more than 6 years in advertising and sales promotion of photographic products, and has spent many years in the advertising agency field.

## ELEC'L CHANGEOVERS

(*Continued from page 16*)

right—from each projecting position).
(2) Single finger push to each projector.
(3) Single foot push to each projector.

All these controls are regular industrial ironclad pushes.

The effective wiring diagram is shown in Fig. 11, and it will be seen

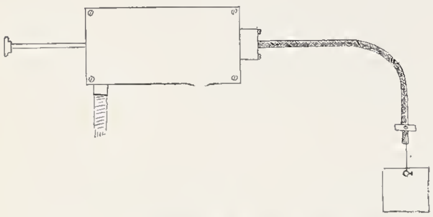

FIG. 10. Diagram of the Zippa unit.

that the whole system is based on simplicity. Table 1 shows all the details of plunger movement, cable lengths, etc. (See also Fig. 10).

After making up quite a number of changeover units in 2-inch conduit, it was decided to employ standard steel boxes 6 inches x 3 inches x 2 inches instead. This economizes in labor charges and is easier to assemble and fit. The unit boxes are jig-drilled standard, except for the vertically mounted units which have the 3/8-inch hole at one end of the box. At the other side of the case a 5/8-inch hole receives the brass tube into which the end nosing fits. Two bolts hold the whole assembly quite rigid. The

**TABLE 1.**

| Projector | Piston Travel | Bowden Cable Length | Limit Stops | Mounting |
|---|---|---|---|---|
| Westar | 1¾″ | 6½″ | ¼″ | Hor. |
| Simplex | 1 and 7/16″ | Bell crank. | 13/32″ | Hor. |
| Kalee 8. | 1 and 3/16″ | 24″ | 17/32″ | Vert. |
| Kalee 11. | 1 and 3/16″ | 24″ | 17/32″ | Vert. |
| Kalee 12. | 1″ | 24″ | 5/8″ | Vert. |
| Ross both types | 1 and 5/16″ | 8¼″ | 15/32″ | 30 deg. |

Greenfield flexible tube entry at the bottom of the box near and parallel to the handle shaft. The Bowden casing is in each clamped within a mild steel

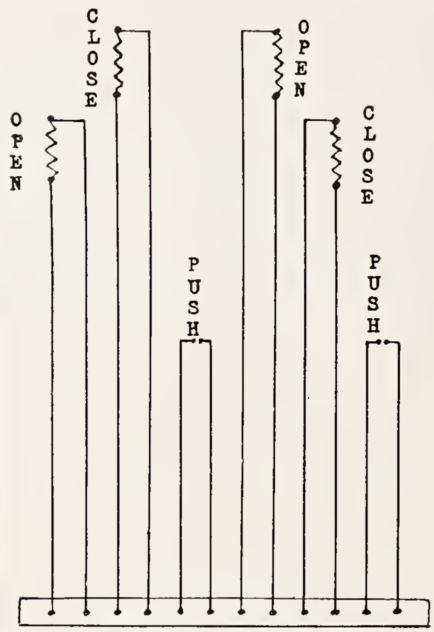


FIG. 11. Connections to 12-way terminal strips.

nose by means of an Allen recessed screw.

The brass tube carrying the solenoids has a small steel collar with reduced endpiece which fits into a two pairs of wires from the solenoids are taken to a four-way terminal strip and soldered. The strip is paxolin, and it is bolted to the box, using ¼-inch tube spacers. The outgoing polyvinylchloride four-core cable is soldered to this strip, and is 4 feet, 9 inches long.

In several instances some pickup from the pushes has occurred on the sound system; a certain cure for this trouble has been the inclusion of one 0.1 mfd capacitor across each push.

It is not claimed that these units are ideal from a technical and mechanical viewpoint. Indeed, they could possibly be made more efficient from such observation, and with more elaborate tooling; but as far as actual operation goes, these changeovers are imperceptible—which surely is the criterion.

### All-Europe Tech Conference

The fourth congress of the European Union of Film and TV Technicians, recently meeting in Versailles, France, has asked for an All-European film conference on a technical level to integrate European film industries. Problems of both motion pictures and TV would be considered, and the conference would be attended by major delegates from both mediums, from producers on down.

## EQUIPMENT IN ARMY AND AIR FORCE THEATRES

(*Continued from page* 31)

image size. Movable masking, while undoubtedly presenting the best appearance, leaves something to be desired unless experienced personnel are always at hand to keep it in proper trim, for any imperfection will be painfully apparent.

For some years, this Service has been using gray instead of black masking. This does not contrast strongly with aluminum screen surfaces, which also have some advantage in that they do not reflect house lighting in the direction of the seating areas and they appear darker than white screens under diffuse lighting. Under these conditions unmasked screen areas are hardly noticeable and have no ill effects. Large unused areas, of course, are concealed by the screen curtains, which can be stopped just outside the picture area by means of stop-start-reverse curtain controls.

It will be recalled that for some years the subject of masking has been under discussion. Studies, made by agencies independent of the motion-picture industry, have shown that a bright working area surrounded by darkness leads to poor viewing or even eye fatigue.

Aesthetically it has been argued with good reason that a greater feeling of participation in screen action exists if the attention is not diverted from the picture by extreme brightness contrasts at the edge, for any strong contrast will tend to force itself on the consciousness. Ideally, it would appear that the edges of the image should simply fade from view. The choice of gray masking (and screen surrounds of fairly neutral color) was made to minimize these contrasts. If the favorable reception accorded it in the theatres has validity, it has accomplished its purpose.

About five years ago it was decided to institute 16-mm service for small military installations where 35-mm service was not feasible.

### *New 16-mm Projectors*

At first, surplus 16-mm projectors were made available provided maintenance was taken care of by the AAF-MPS. The machines were old and repair costs proved to be excessive. They have gradually been replaced by new projectors and at present only a few old ones remain in use. These will probably be replaced within the next year or so, for some parts are no longer in production. Following this, replacement will be relatively slow until aging and normal wear and tear begin to take effect. No attempt can be made to forecast this date until the repair experience begins to indicate its approach.

Although 16-mm projectors cannot compare in durability with 35-mm machines, the life in other than portable service is expected to be a considerable number of years. About all that can be said on average life is that it is extremely variable, depending on conditions of use.

Finally, there is the question of planning for the future. The replacement program is again approaching what might be called a condition of stability, for the requirements of the new processes have been largely met. But this does not mean that the program is at an end. Improvements are always being put into effect, and equipment continues to become obsolete.

No industry can stand still if it is to remain healthy in the face of new forms of competition. While we may hope for a reasonable period of standardization, we must expect new developments at some future time. The Army and Air Force Motion Picture Service is prepared to keep abreast of the industry, but it will be the responsibility of private enterprise to pioneer the development.

[THE END]

### RCA Distribution Program

Effective January 1, 1958, a new product-distribution program to enable RCA theatre supply dealers to become distributors of a broader theatre sound equipment line will be instituted. Under the program, RCA will convert its theatre supply dealers organization to theatre sound equipment distributorships embracing RCA's theatre sound equipment line, and new types of packaged sound equipment. These are lines of microphones, loud speakers, and amplifiers for wide application. The new distributorships will be offered to RCA's twenty-seven theatre supply dealers located in key film centers throughout the country.

## Nat'l Theatres, Warner Bros. Sign for Cinemiracle

Warner Bros. and National Theatres, Inc., have signed a deal with Cinemiracle process to co-produce an as yet unspecified number of films in that system. The multi-million-dollar productions are slated for long-term roadshowing. First on the schedule will be "The Miracle," the play usually associated with the great German director, Max Reinhardt. It is scheduled to role early in 1958.

Cinemiracle (see IP, March 1957, p. 16, *et seq.*) is the new widescreen process utilizing three interlocked projectors, employing mirrors. This is designed to eliminate the dividing lines between screen panels.

At a recent demonstration in Hollywood, the Cinemiracle process was rated as being at least equal to, if not better than present widescreen processes. The demonstration was shown at a ratio slightly more than 2½ to 1. It is expected that the average screen used will be about 35 by 80 feet, with a field of 146 degrees wide and 55 degrees high, which approximates that of human vision. The projection machines will be housed in one room, but installed on the orchestra floor, and some removal of seats will be necessary to accommodate the large screen which will be placed in front of the proscenium.

The process, in which National Theatres originally invested $1,500,000, has been two years in development. At the moment, Louis de Rochemont is producing "Cinemiracle Adventure," an adventure-travelogue, as the initial feature in the process.

### 20th Drops Optical Prints

20th Century-Fox has discontinued use of optical prints, concentrating on releasing only magoptical. This however, does not indicate a drop in production of prints, since 20th maintains that it is still putting out as many as 450 prints on top releases, just slightly below the print total when both optical and magoptical were being put out.

## 16-MM PROJECTION

(*Continued from page* 27)

12 by 12 feet. The company expects the in-a-minute transparency to greatly broaden the use of visual communication.

### *Historical Collection*

The Irving Browning Collection of early motion picture apparatus was exhibited by the Society of Cinema Collectors and Historians, of which Browning is president. Entitled "Beginnings of the Visual by Photography," the collection included:

Daguerre camera, circa 1845; early Eastman roll film camera, circa 1888; an early table model stereo apparatus for viewing, circa 1860; early experimental motion-picture mechanisms various sizes, 9½-mm, 11½-mm, 28-mm: early brass lenses, twin stereo lenses, four lens units used to make four tintypes at one time; a Zoetrope 1865, a Praxinoscope 1872, and a table model paper movie viewer, 1910; large reproductions of early experimental theatres, showing methods of projection; professional Magic Lantern, with a three-wick kerosene light, and a group of Natural History cards, circa 1866; a collection of kerosene-burning Magic Lanterns, circa 1910; miniature cameras 1910-1950; a "detective" camera 1904, early studio cameras, daguerrotypes, photos, movie projectors, the first Eastman 16-mm, and many other exhibits.

### *Guest Speakers*

A number of guest speakers covered a wide variety of industrial A-V topics at the exhibition, with John Flory, advisor on non-theatrical films for Eastman Kodak, key-noting the event: "The Economic Impact of the Audio-Visual Field on Industry." George Huntington, director of sales development, Television Bureau of Advertising, Inc., discussed the "Whys and Hows of Major Presentation." "The Industrial Film Sponsor and His Problems" was analyzed by Willis H. Pratt, Jr., film manager for American Telephone and Telegraph Corp.

The military view was taken by Lt. Col. R. A. Bassler, USAF, assistant secretary of the Audio-Visual Services of the North American Air Defense Command: "The Practical Application of Audio-Visual Techniques in High Level Military Headquarters." J. B. O'Connor, manager of the Eastern division of TNT's Tele-Sessions, Inc., discussed that medium in "Closed Circuit TV for Industry—Down-to-Earth Facts, Case Histories, and Results."

The final day of the exhibition was

devoted entirely to lectures and film presentations on Training, under the supervision of Dr. Robert Lloyd Cantor, director of Training for the Ronson Corp., and a member of the board of directors of the American Society of Training Directors and National Visual Presentation Association.

Taking the recent exhibition as a barometer, industrial A-V should be due for a sharp upswing in its already ascending business curve. Considering that some small confusion existed at the exhibition because it was the initial conclave, there seemed to be little doubt that the importance of A-V techniques to the industrial world will be given increased consideration. What is significant is the fact that the exhibition denoted a concerted effort on the part of manufacturers, managers, directors and others. Particular credit should go to the National Visual Presentation Association, under whose auspices the exhibition was held.

## TOA-TESMA REPORT

(*Continued from page* 29)

A. J. Platt, RCA; Edwin Wagner, Wagner Sign Service Co.; Fred Wenzel, Wenzel Projector Corp.; and Marty Wolf, Altec Service Corp.

Equipment-wise, the year's new developments were featured, which have been duly detailed in this magazine throughout the past twelve months. A few significant touches were evident: National Theatre Supply exhibited North American Phillips (Todd-AO) equipment; Century Projector is manufacturing the equipment for the Cinemiracle process which received quite an accolade at its trade showings in Los Angeles and New York; Simplex Equipment Corp. exhibited its new 5-to-1 intermittent movement which was the feature of last month's IP; and the new "WISP" wireless sound speaker for drive-ins was being plugged by Vido-Sound Corp.

There is, obviously, not room here to detail all the new and fine equipment that has appeared in the last year. But, since it has not been mentioned publicly yet, IP should like to inform the California Chamber of Commerce . . . it rained.



## SIDE-WEAVING: COMMON PROJECTION DEFECT

(*Continued from page* 11)

of whatever "green" (brand-new) prints that may be received at the theatre. Unless treated with very special care, green prints show up side-weave very prominently, especially if they be CinemaScope films requiring anamorphic lensing with a doubling of the horizontal dimension.

When projected at even moderate arc currents, fresh prints are likely to "stick" as they pass through the hot projector gate. A sticking prints chatters loudly in the projector and has fits of jumping violently on the screen. (The jumping is caused by slippage and overshooting on the intermittent sprocket.) Severe sticking may injure the sprocket holes of the film.

Sticking is caused by the melting of fresh, moisture-laden gelatine emulsion and its deposition upon the gate runners where it hardens and interferes with smooth passage of the film. Hardened gelatine deposits often cause a line to be scratched longitudinally along the middle of the perforation area on each side of the film—telltale evidence of sticking. Adequate waxing of the film by the exchange or the processing laboratory largely obviates sticking and consequent film damage. Waxing is frequently inadequate, however, forcing the projectionist to oil the film for smooth running.

Squirting oil all over the surface of a green print, or even applying lubricant to the margins of the film as it runs through the projector, is not good practice. The print becomes soiled, picks up dust easily, and produces a flickering, mottled appearance on the screen. Moreover, the heat of the arc lamp vaporizes the excess oil and causes it to condense as a fog of oil droplets upon the rear surface of the lens. The picture then becomes dim and hazy, and the heat absorbed by the film of oil may crack the lens.

Whenever it becomes necessary to lubricate a print in the projection room, wipe both sides of each roll of film with an oily cloth, following the curvature of the convolutions. (This may be done through the openings in the sides of aluminum and welded-wire reels.) Enough oil will seep into the perforation margins to prevent sticking without making the print messy; and because the oil is applied to *both* edges of the film, the severe side-weaving caused by oil on alter-

nate edges is prevented.

The *total amount* of pad pressure applied to the film in the gate does not have much influence on sidesway, hence an excessively high pad tension should be avoided. Employ the normal amount of pad pressure (12 to 16 ounces for average "broken-in" prints, 8 to 10 ounces for "green" prints), and have the same amount of pressure on each side (e.g. 7 ounces on each side for a total of 14 ounces of tension).

It is strongly recommended, however, that the set of tension pads in the vicinity of the aperture have greater pressure than the set or sets above the aperture. If the film encounters *increasing* pad tension as it travels down through the gate, the pendulum-like oscillations of the film, "pivoted" by the upper guide roller, will be more effectively damped.

### Attention to Signs of Wear

The usual close attention should be given to the condition of the gate film runners and tension pads and all such components replaced when they show signs of wear. A short steel straight edge is useful for detecting humps and hollows in the film runners. (Place the straight-edge on each runner and shine a flashlight on the casting *behind* the runner.)

The flanged guide roller at the top of the gate should press against the edge of the film very gently, so examine the bahavior of the film at this point while the machine is running. Fluttering or "pinching out" of the film indicates excessive flange pressure. It is sometimes necessary to cut out and discard a few turns of the small coil spring to decrease flange tension. The guide roller should turn freely in its pivot bearings, and the flanges should slowly revolve while film is running. A flange that fails to turn will become scored by the edge of the film.

Studio-guide rails present a difficult problem and their effectiveness is difficult to assay. The manufacturer's instructions anent their placement and spacing should be followed; but, in any case, the two rails must be far enough apart to permit unimpeded passage through the gate of unshrunken film and slightly misaligned splices.

Especially avoid making excessively large upper loops when threading the projectors! This is very important. Because the film loop lengthens and shortens 24 times every second, an upper loop which is too large flops violently and, besides being noisy, increases the tendency of the film to undergo sidewise movements in the gate. Make the upper loop large enough to permit framing all the way up on the screen, should this necessity arise, but guard against an unnecessarily large loop.

Observance of these few precautions is certain to bring about a noticeable steadying effect in the projected pictures in those cases where projector-caused sidesway has been troublesome.

## NON-SYNC MUSIC

(*Continued from page* 12)

ing of the double-stylus arm of the binaural disc. Let the interested reader arrange for a demonstration of the twin-track tape playback equipment and make his own decision.

### Twin-track Tape

A word is in order at this point regarding our use of the term "twin-track." Actually this is a description of a type of recorder which uses both sides of the tape, reversing at the end to provide twice the playing time. We are referring to tapes which have two channels recorded to provide stereo-sound. A large selection of pre-recorded tapes in such stereo recording is available and can prove useful to the theatre. Whatever means of reproduction may be used, each selection should be carefully classified in order that proper selection may be made for each type of film program.

There is more involved in wide-awake use of non-synchronous equipment than mere esthetic values. Consider if you will the promotional opportunity for special introductions of sound track selections from forthcoming productions. "This theatre proudly presents selections from such and so film which opens here on blank date—".

One last thought on the dissemination of non-sync music. All music of whatever type, whether overture, intermission, or exit music should be bridged to distribution amplifiers and associated speakers which will take the incidental music and message throughout the theatre. In this way, the patron will be escorted musically throughout his stay within the theatre walls. Is all this worth it? We think it is, and we hope the projectionist can serve as the intermediary which can bring about revision in the practice of the vast majority of our theatres. Certainly in this matter we can do well to give of our best, even as we strive to keep abreast of the best of showmanlike projection.

# "Christmas! Bah! Humbug!"

The man in the wheel chair leaned into the microphone. "Christmas!" he snarled. "Bah! Humbug!" And, as they had in Christmases past, millions of young listeners chilled at the mental picture of the baleful Scrooge.

It was a Christmas institution, back in the Forties, this annual reading of Charles Dickens' classic. Its reader was something of an institution himself. In his turbulent lifetime he had been an unsuccessful painter but a good amateur second-baseman, a composer whose music was played by the New York Philharmonic, and a model for Frederick Remington.

To most people, though, he was Lionel Barrymore, the actor, and they loved him.

He was both crusty and kindly (he loved reading "A Christmas Carol"), adventurous, stubbornly independent in thought and outlook. And game as they come. Although an accident in 1936 imprisoned him in a wheel chair, he went resolutely on—working in motion pictures and making public appearances for nearly twenty years more.

No question but that Lionel Barrymore was one-of-a-kind. Yet the qualities so richly combined in him exist in a large measure among all the 170 million of us who call ourselves Americans.

They're why we are what we are, why our country is one of the strongest on earth. And why there is no wiser investment than an investment in America—through U. S. Savings Bonds, which guarantee the safety of your savings, up to any amount, and the rate of your return. Start buying Bonds today, through Payroll Savings or where you bank. And hold on to them!

**Now Savings Bonds are better than ever!** Every Series E Bond purchased since February 1, 1957, pays 3-¼% interest when held to maturity. It earns higher interest in the early years than ever before, and matures in only 8 years and 11 months. Hold your *old* E Bonds, too. They earn more as they get older.

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